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FOOD MANUFACTURE

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FOOD MANUFACTURE

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Food and Nutrition at Eastbourne

EVERYBODY was wearing an overcoat with collar turned up to combat the arctic conditions in the hall at Eastbourne where the Food and Nutrition Section of the Congress of the Royal Sanitary Institute was held. Some of the wild and wintry weather of April 26 had percolated indoors, but this did not affect the numbers or the interest of the audience. Chairman A. L. Bacharach started the proceedings with commendable punctuality and held the attention of his hearers throughout, despite the fact that not only the climate of the hall but also its acoustics might have militated against the success of a less arresting discourse.

As will be gathered from the report of his Presidential Address, published in this issue, one of Mr. Bacharach's points was that it would be well, in the preparation of food, to avoid a doctrinaire passion for destroying bacteria which might result in the unnecessary destruction of food values, and that it behoved us to steer a middle way by means of close collaboration between the food technologist and his bacteriological colleague.

The three papers presented had been circulated previously, and the arrangement whereby the authors should content themselves with "pin-pointing" their main theses, in order that ample time would be available for discussion, worked out excellently, the last speaker finishing at one o'clock precisely, as per schedule.

The opportunity for discussion was well responded to, a large part of it naturally being concerned with the cleaning of equipment, the personal habits of the operative, and the care taken during the distribution of food.

How to make workpeople wash their hands was a problem which, judging from the remarks of the various speakers, seemed to be without a short-term solution. Education? Yes. But precept must be accompanied by example and managers must also be immaculate. One speaker suggested that agar plates should be prepared from swabs from operatives' hands and shown to them—the "horrible example" technique which might be well worth trying. Another suggestion was that conferences should be held between workpeople and laboratory staff.

The problem was approached from many angles. The suggestions were practical. Clean hand towels, spotless lavatories—not "things to shudder at, not to see," and so on.

One point raised by Dr. Coppock was that the adoption of new procedures devised to improve food hygiene might produce new problems not at once apparent, and he gave bread wrapping as an example. The wax in wrapping paper might, in certain circumstances, be absorbed by bread in quantity exceeding the tolerance allowed by the Mineral Oils in Food Order. The industry is being advised how to use these papers without the provisions under this Order being affected, but this example emphasises how hygienic measures, however desirable, must be considered in relation to other effects that the measures might produce.

The meeting was a highly stimulating one, and must have convinced the large numbers of sanitary inspectors, medical men, and others that the food technologists and food scientists are getting on with their job and mean to continue to do so.

The World's Food

In the opening address (read in his unavoidable absence) at the conference on the world's food and Britain's needs recently held in London by the Association of Scientific Workers, Lord Boyd Orr pointed out that there were two dangers in the present world food position—one political and the other economic. He said that revolt against poverty was the fundamental cause of the upsurge in Asia, which was by far the most important political problem of our day. The likelihood was that it would spread to other countries such as Africa, the Middle East, and Latin America.

Another danger was of a different kind. In the U.S. today unmarketable supplies of food were probably the greatest domestic political problem. The export market was blocked because countries needing food lacked the dollars to purchase it. Farm prices were falling, and this contributed to unemployment in the industrial areas which, in turn, resulted in decreased purchases of the more expensive foods. All this savoured of the vicious circle which contributed to the economic crisis of 1929-30.

In considering this economic food problem, Lord Boyd Orr said that it was necessary to keep in mind

its industrial aspect. With the advance of technology, more and more goods could be produced with less and less labour. Already there was a fight for world markets, and the world, therefore, was faced with the problem of finding markets for the terrific industrial machinery modern technology had created and also for the food supplies which, with modern technology and equipment, could be so rapidly increased.

These two problems of scarcity of food bringing about revolt over a large part of the world and unmarketable surpluses creating economic difficulties in another part should cancel each other out.

If the proposals made by FAO in 1946 for a World Food Plan to double world food production in the next twenty-five years (that is, the increase needed to provide sufficiently for the people of all countries, taking account of the anticipated increase in the population) were implemented, there would be hope for the hungry people of the world, who might then be called upon to lay down their arms and to take up the plough.

Biscuits and Points

Biscuit manufacturers in Scotland were facing a serious situation consequent on the introduction of the reduced points system which has now been completely abolished. Before the change the fact that biscuits of the more popular type—hard dough and cream-filled biscuits—were on points meant that the public thought twice before buying. With fewer points to play with they thought three times.

The net effect was a reduction in biscuit sales, irritation for the retailers who had shops full of biscuits, anger for the housewife who definitely wanted biscuits but hesitated to use points for them, and a headache for the manufacturer. He was faced with concentration on non-points unsweetened biscuits or the reduction of staff. He could not do either, since the first alternative had already been exploited fully, while loss of staff meant inability to recover the labour when it was again wanted. He could manufacture for stock, but there was an obvious limit to stocking.

The attitude of the Scottish trade was that a gradual system of points values would have served much better than the one which demanded 12 points per lb. for the popular types of biscuit.

Buying had largely stopped, and the abolition of the points system will have resulted in a change for the better for the biscuit manufacturers. It is indicated that demand is switching increasingly to sweetened fancy types, and that for unsweetened and inferior or less elaborate types is less urgent. This liberation from the points system should give the public and the trade a greater scope for efficient working.

White v. Brown Bread Again

After a debate on April 20, which was resumed a few days later, Lord Hawke's motion, "That there be laid before the House Papers relating to the present quality of flour used for breadmaking," was withdrawn. During the debate the old familiar arguments were repeated, the only novelty being the exhibition of a wholemeal loaf baked by Lord Sempill. Lord Hawke's approach, he explained, was solely as a consumer, and he stigmatised the present-day loaf on the grounds of its dirty colour, bad taste, bad keeping quality, and indigestibility. It also had to be adulterated by a chalk-like substance to offset its phytic acid content.

What stood in the way of a reduction in the extraction rate? he asked. He believed it was dollars. With the exception of three speakers, who went all out for 100 per cent. extraction flour, the weight of opinion was in favour of whiter bread.

At the end of the debate Lord Alexander said that he could hold out no promise of an early change in the extraction rate, but informed the House that the Food Minister would consider the suggestion of convening the post-war loaf conference and that a special sub-committee had been appointed to examine the progress made in investigations which were recommended by that conference in 1945.

There is no doubt that a change to 80 per cent. extraction would be welcomed by the baking industry and the majority of consumers.

Report with a Difference

"Health and cheerfulness mutually beget each other." Although these words of Addison's were written more than a century ago, the memory of them must have remained fresh in the mind of Barking's Medical Officer of Health. Here is a report with a difference. No mere presentation of dreary facts and figures for Dr. C. Leonard Williams. His report to the Barking Education Committee on the School Health Service has taken the form of question and answer, the answers being enlivened by the incorporation of anecdotes where applicable.

One, for example, under the heading of School Meals and Milk, to illustrate the difficulty of approaching the subject of diet with meticulous scientific technique, tells of a friend of Dr. Williams who was interested in dietetics. He chose fowls for the subject of his experiments and found that a very simple enquiry required no less than thirteen different sets of experiments. Dr. Williams recalls hearing about this task when it was only half completed and was struck by the fact that the fowls could never be induced to live long enough to make the whole experiment worth while.

The M.O.H. gives three reasons why his report

should be read—that we should be interested in the health of Barking children, that if we are not, then we ought to be, and that as he has tried to make his book readable, he would be disappointed if his attempt had failed.

We do not think Dr. Williams will be disappointed. Because of its informality, the book will appeal to a wide reading public without impairing its value for those concerned with the more statistical side of a report of this nature.

Products from Groundnuts

Apart from its increasing popularity as a food, the groundnut is believed by U.S. experts to have many hitherto unexploited uses in the field of industry; widespread application of new technological methods depends, however, on lower costs of nut production.

Nearly one-third of the United States shelled crop is sold as salted nuts, usually cooked in groundnut or other vegetable oils. Recent innovations are groundnuts cooked in butter, or seasoned with curry. The rest of the shelled crop is used in sweets and bakery products. A new food still in the experimental stage is a frozen dessert with groundnuts as the basic ingredient. Between 15 and 20 per cent. of the total crop is crushed for oil, used chiefly for food, and an intensive research programme is being carried on at present to find new uses.

The residue, after the nuts have been crushed, contains most of the groundnut protein and is an excellent animal feed. As much of the value of the protein is lost when high temperatures are used in removing the oil, present research is directed towards finding less destructive methods, which will produce a superior animal feed as well as meal residues for industrial applications. Solvent extraction, which requires special modifications for economic operation on groundnut oil, seems likely to fulfil the requirements in this connexion.

New Beet Sugar Process

At least three beet sugar factories in the United States have adopted a new process which reduces water consumption by about 30 per cent., increases sugar yield by 1·5 per cent., and greatly minimises the trouble of pollution by effluents. The process is based upon the idea of re-using the waste waters for further extractions.

In the orthodox system the milled beets are extracted with fresh water, and eventually the pulp-washing water and the water from draining and pressing the pulp are discarded. It has generally been considered impossible to re-use these washing waters, although they still contain some sugar. Fermentation quickly reduces the sugar value, and non-sugar materials also dissolved in the water would in any case complicate sugar purification processes. These wastes contain a good deal of suspended matter, are objectionable, and their disposal is often associated with further costs.

In the new recovery process these wastes are immediately chlorinated; about 40 parts per million of chlorine are sufficient to destroy bacteria. Lime is added to maintain a suitable *p*H level. The chlorine also causes the precipitation of most of the non-sugars dissolved in these waste liquors. After standing in sedimentation tanks, the washings, largely free from both suspended and non-sugar matter, are added to fresh water for further use in the extraction of milled beet.

It is claimed that the process extracts an extra 4 lb. of sugar per ton of beet. Applied to all U.S. beet sugar factories, it would save 20,000 tons of sugar per year, equivalent to the yield from some 9,000 acres of beet.

Human Relations in Industry

Those responsible for the handling of labour, whether it be skilled, semi-skilled, or unskilled, have widely divergent ideas as to how it should be done. Learned or near-learned books have been written, and are still being written, on the psychology of management. The pride of many firms is in their "staff welfare." Old stagers of forty and fifty years' service are presented with medals, watches, and silver ashtrays *pour encourager les autres*.

A large number of industrial firms issue house journals, which give their employees a personal interest in their activities, but a publication of a different kind is a booklet *British Railways Welcome You*, which is an interesting attempt to convince new entrants to the service that he or she has become a member of "one big happy family."

Consisting of forty-eight beautifully produced pages, combining instruction with entertainment, the booklet, printed in large type, describes the work in simple language and widely spaced paragraphs.

Statistics are presented in a picturesque way; for instance, the total number of the staff is expressed as being "about six times as many people as the crowd at Wembley on Association Football Cup Final day."

How the organisation works is explained with commendable economy of words; illustrations show the different jobs being done, and the text is interspersed with a large number of clever cartoons.

It is for others to assess the ultimate value of this mixture of glamour, humour, and hard facts. We should, in due course, like to know, as we presumably have a right to know, seeing that we are paying for it. It may hit the target and, if so, might well be adopted by members of the larger industries in view of the fact that the problem of human relations in industry is of such importance at the present time.

This Year, Next Year . . .

Plans by one of the large biscuit organisations for an extension of their activities in the Sighthill district of Edinburgh have been rejected by the Government. The company bought a site for a new factory, prepared roads and other services, and have now been advised that they can apply again for permission to build in 1951.

This may mean that Edinburgh will lose an important new factory which would employ 1,500 workers. Biscuit manufacturing is an Edinburgh industry, and transfer of this proposed new factory to Glasgow would be a blow at its prestige and development.

The Town Council are fighting the Government's ruling, and have determined to oppose the attitude that Edinburgh is not a development area and therefore existing industry cannot be extended.

The biscuit manufacturers in question are anxious to remain in Edinburgh and to expand there; they are now in the difficult situation of having no precise knowledge as to whether, and if so when, they will be able to develop the site they have acquired.

It is ironical that Government-sponsored building is going on in the same area—with taxpayers' money being expended on Stationery Office requirements while tax-paying industry is refused development space and facilities.

Talking Fish

Many of the kippers on sale in America boast tartan wrappers and are labelled with names suggesting Scottish origin. This shows a certain temerity on the part of fish salesmen in view of the fact that, according to a Norwegian newspaper, "the Americans found out about a year ago that herring talk, at least in America."

The Norwegians have taken note and have advanced the hypothesis that if herring can talk, it is not less likely that cod can also talk, even though it may not be the same language. Unfortunately this interesting point is not enlarged upon and leaves a doubt as to whether each fish has a lingo of its own, or whether it adopts the language of the country whose waters it inhabits. Would the speech of the well-bred sole, for instance, be easily distinguished from that of the "Wotcher, cod!" species? And would the American herring be easily recognisable by its transatlantic accent as opposed to the spouting of the Arctic whale ?

However, the Norwegians, without wasting time on such *minutiae*, are studying the behaviour of the cod at the Lofoten fishing banks by means of a marine research vessel equipped with a giant microphone which is lowered into the sea to find out if the cod talks. Here at last, perhaps, will be found the answer to Leigh Hunt's question to the fish: "How do ye vary your vile days and nights? How pass your Sundays?" The spawning period has doubtless been chosen in the belief that the breadwinner of the *Gadus callarias* family is likely to prove most voluble at this crisis in his life when, more often than not, he is presented with something like six million offspring.

It may not yet have occurred to British scientists, busy with new methods of studying fish behaviour by under-water photography and cinematography, that a far, far easier way is at their disposal. A word picked up here and there from a pair of potential kippers might yield valuable information as to their proposed itineraries. Direct observation of the fish by frog-men has already been considered, and it is not difficult to visualise the day when B.B.C. compères, suitably attired, might wander among the shoals with a microphone and thus introduce a new feature into the "Down Your Way" programme.

But this, of course, is presupposing that British herring have reached the same standard of education as the American schools of fish. If they have not already done so, perhaps the present fluctuating prices for fish will rouse them to loquacity.

Mushroom History

Commercial mushroom growers complain that the falling of mushroom prices from 7s. a pound paid to the grower in 1944 to only 3s. today shows no sign of levelling out; only increased output and a pooling of knowledge will provide the answer to the problem.

Magnesium deficiency and impoverishment of animal manures through reduction of feedingstuffs are two factors affecting the British mushroom industry. Nevertheless, it is reported that there are 2,000 Lancashire growers producing crops under glass, while research is being energetically pursued at the stations at Cheshunt and Yaxley.

This recalls the curious history of cultivated mushrooms in contrast to ancient "wild" mushrooms mentioned right back in the Talmud and in Chaldean scripts. Before the French botanist Tournefort in 1707 made first references to cultivation, widespread collecting was necessary to satisfy what was called "an orgy of fungus eating."

Then came pure culture spawn, which was in great demand as it could only be used for one crop, and "virgin spawn" had to be collected from pastures.

For some years France was to the fore with her *Service des Blancs des Champignons*, maintained at the Pasteur Institute.

The year 1905 saw the realisation of the cultivator's dream, when the U.S. Department of Agriculture perfected spawn production by cultivating a piece of internal tissue of stalk on nutrient media, a method used by British growers.

Gas Circulation in Grain Silos

E. E. TURTLE, M.B.E., M.Sc., Ph.D.(Lond.), A.R.C.S., D.I.C., F.R.I.C.
Chief Chemist, Infestation Division, Ministry of Agriculture and Fisheries.

Insect infestation in grain is an ever-present problem facing the milling industry and food manufacturers handling cereal products. This article describes a complete treatment including gassing, circulation, standing, airing, and delivery of the grain which can be carried out in twenty-four hours at low cost. This brings the price within the requirements of the large port silos where treatments can be of major value in arresting the spread of infested grain into the country.

MILLERS, manufacturers of speciality food products, and other classes of cereal processors are only too well aware of the difficulties caused by insect infestation of their raw material. Sound unholed grains are needed for satisfactory processing in the mill; clean unheated grain is required if the product is to be free from mouldy taints. If products are to keep up with ever-rising standards of food hygiene the total absence of insects is to be aimed at. Even if this aim cannot be achieved, dead insects are better than live ones because they do not interfere with further storage, they can be screened out more readily, and they do not spread and contaminate premises, machinery, and bags as live ones do.

To the grain storeman the absence of active insect infestation is even more important. Infested grain cannot be stored safely: it will certainly suffer from deterioration; it will probably heat and mould; and, in any case, it will be a nuisance, needing special attention, turning, and premature consumption.

Infestation in Imported Grain

Owing to the many and varied sources of supply and to the different conditions in producing countries, and in spite of recent moves towards international co-operation, total absence of insect infestation in the grains arriving in Great Britain cannot be regarded as more than an ultimate aim. Shipping authorities, grain warehousemen, and millers, are aware that appreciable quantities of insect infested grain do come into the ports.

Unfortunately, there does not appear to be any near prospect of a substantial change in this position. Imported grain goes either for further storage before allocation, or to millers or other processors where it may also be stored before use. Some of the infested material is treated at the ports. However, largely because of the absence of suitable facilities for treatment, considerable quantities pass on with their original active infestation, resulting in risks of further damage on storage and the necessity of taking precautions to prevent the spread of insects to transport vehicles, premises, and other commodities.

Unfortunately the trouble is not confined to imported grain. In spite of the spread of expert advice and the adoption of improved measures of prevention and control, some home-grown grain before reaching the mill passes into infested warehouses or other stores, infested bags, or infested transport vehicles.

For these reasons, much experimental work has been carried out in order to ascertain methods of treatment which are usable under normal commercial conditions and which can be applied on a wide scale.

Treatment of Grain in Silos

A previous publication has indicated the general course of development of methods in Great Britain during the war years. (E. E. Turtle, *Ann. app. Biol.*, **35**, 302, 1948). To be applied on any scale under present conditions, methods must be suitable for use without too much disorganisation of transport, of handling plant, or of stores. For this reason the methods used in different ports vary largely, each being dependent upon the existing handling facilities, storage practices, and so on.

Almost all British imported grain is shipped in bulk and is unloaded mechanically by bucket elevators or by suction. A very high proportion goes into silos at the ports either for storage or in

A grain silo.

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The top floor of a silo where granular calcium cyanide is being added from a drum to grain entering a bin through a chute. *Crown Copyright Reserved.*

transit. This form of storage also is very common in mills and similar premises.

Incorporation of Granular Powder

Although various methods have been used either experimentally or on a small commercial scale, the only technique now used widely is the admixture of a granular material containing calcium cyanide (Cyanogas "G" Fumigant) with the grain as it enters at the top of the silo bin. The procedure is to run the grain into the silo bin at a known rate. The granular powder, at a rate of about ½ lb. per ton of grain, is run through a calibrated nozzle into the grain stream. After filling, the bin is closed down and left for not less than ten days before opening. The insecticidal action depends upon the chemical reaction of atmospheric moisture with the calcium cyanide. Small quantities of hydrogen cyanide are given off according to the following chemical reaction: $CaCN_2 + H_2O \rightarrow Ca(OH)_2 + 2HCN$.

Before the method was adopted as a routine measure, much work was done to assess the possibilities of leaving toxic residues or of producing other harmful effects on the grain and to ensure that no undue operational hazards were experienced. Its efficacy was also investigated, in so far as this was possible without using the method on a wide scale. Although it has proved to be of great value, various important limitations in the method have become apparent in practice. These relate both to the general running of the process and also to the result achieved.

Some premises have proved unsuitable because too high concentrations of hydrogen cyanide are liberated into the working spaces, such as silo-top floors. In other cases grain handling plant or the structures of bins have not been suitable for the process. Other important practical objections arise from the necessity of leaving the grain standing for not less than ten days and of having trained operators supervising treatments.

Difficulties of Admixing

It has been found difficult to achieve an even admixture of powder and grain under all conditions, and wide discrepancies in the amounts of powder at different points in the grain have been found, particularly in certain premises. The method has had to be ruled out for grain of less than 11 per cent. moisture content, because poor results in the treatment of such material were shown to be due to the failure of the chemical reaction to take place completely, owing to low atmospheric humidity, with consequent failure to liberate hydrogen cyanide. It also had to be ruled out for grain of more than about 16 per cent. moisture content; such grain continued to heat after treatment, presumably because the concentrations of hydrogen cyanide present have no substantial effect upon the micro-organ-

A silo fitted for gas circulation. The manhole has a heavy metal cover fitted with a rubber gasket. *Crown Copyright Reserved.*

isms which flourish under such conditions. For these reasons, coupled with the fact that the only supplies of this insecticide come from overseas, alternative methods are obviously desirable.

Finding the Ideal Method

To meet the practical requirements in silos, the ideal method would be to treat full bins as they stand, without having to resort to turning the grain from one bin into another. This has been attempted with various fumigants in different parts of the world with varied, but not very marked, success. Certain chlorinated hydrocarbon fumigants are suitable for this method: they have a high vapour density; their boiling points mostly are at or above normal atmospheric temperature, thereby facilitating their handling; with certain exceptions, they can be detected readily by the senses; and their toxicities to man are not alarmingly high. In particular, ethylene dichloride, carbon tetrachloride, and methyl bromide, separately or in admixture one with another, have been recommended. Work has therefore been undertaken in Great Britain to assess their possibilities.

Results of Investigations

Investigators from the Pest Infestation Laboratory applied fumigants experimentally to filled bins of grain and measured the movement of gas by analysis of samples of atmosphere from different localities. By and large, the results of these investigations have confirmed the variability in results reported from practical usage abroad. Under certain very limited conditions, reasonably good results may be obtained with particular substances or mixtures, but the distribution is not uniform and apparently is dependent upon many different factors. As a result it would seem to be extremely difficult to predict how a particular substance or mixture would become distributed under particular practical conditions. These results logically led to an examination of fumigating by forced circulation of gas through grain stored in silo bins.

Prior to the recent war, work in Germany showed that very good results could be obtained by circulation of fumigating gases. The development was encouraged by the authorities, no doubt realising the importance of carefully safeguarding their stores, and a large number of silos in Germany and neighbouring countries were equipped for treating infested grain. Both ethylene oxide and methyl formate were used as fumigants, each with an excess of carbon dioxide. The carbon dioxide was used mainly to reduce the fire risks associated with each of the main chemicals. An interesting feature of the use of excess of carbon dioxide is that most plants included meters, developed from a flue gas meter, to indicate the concentration of carbon dioxide present at any time, thereby giving a check on the gas tightness of the system.

Some of these plants still exist, but it is understood that ethylene oxide and methyl formate have now been replaced by methyl bromide, which is employed without carbon dioxide because of its non-inflammable properties. A big silo installation on the river Danube to which grain destined for Germany was directed for treatment during the recent war is an interesting example of this particular type of plant.

Investigations were also conducted in French North Africa, where some silos were equipped for circulation of ethylene oxide with carbon dioxide.

Pipes, with valves, bring gas through the ceiling of the bins.
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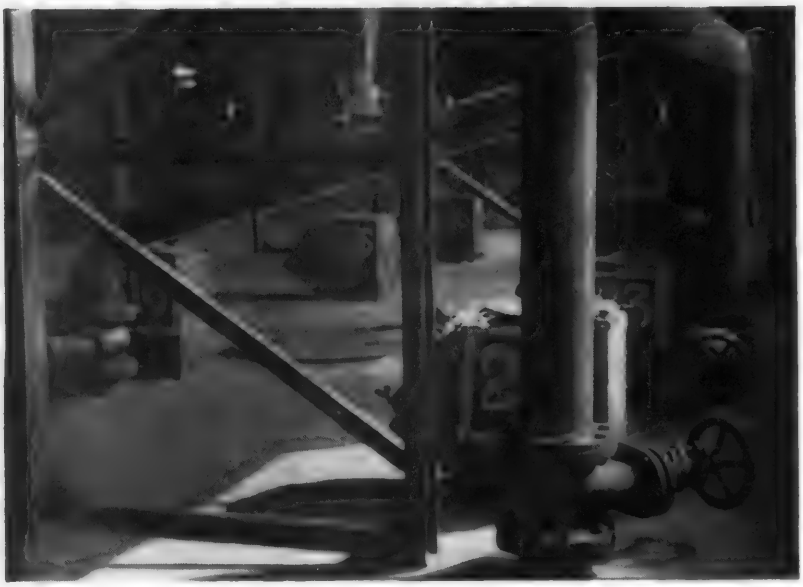
Use of Methyl Bromide

During the years following these developments the most important change in general fumigation practice was the widespread adoption of methyl bromide. The principal reasons for this change are that this chemical has been found to be highly toxic to insects, and to be absorbed much less by foodstuffs than are such gases as hydrogen cyanide and ethylene oxide which had been used hitherto. Partly as a result of this factor, the use of methyl bromide on foodstuffs had been accepted and had not caused objections on account of possibly harmful residues or tainting.

As methyl bromide is also non-inflammable, relatively cheap, and readily available, it is not surprising that its use formed the basis for the more recent investigations in Britain. This work, carried out by members of the Pest Infestation Laboratory in a silo in Liverpool, has been outlined elsewhere in a note by W. Burns-Brown and H. K. Heseltine (*Milling*, **112**, 10, p. 229, 1949). The general conclusion was to confirm that forced circulation is a very efficient process; furthermore, that methyl bromide lends itself readily to use



The bin numbers are on the boxes to which the movable grain chutes are attached.
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in circulatory plants. By carrying out chemical measurements of concentrations of gas present at different positions in a bin, it was shown that substantially uniform concentrations can be obtained readily, thereby ensuring consistent results. It was also shown that airing could be effected rapidly and without difficulty, using the circulatory equipment. In fact, this work demonstrated that circulation of fumigants, particularly of methyl bromide, in silo bins is an appreciably more efficient method of treatment of grain in bulk than any in use in Great Britain at the present time.

Equipment Required

Based on this chemical work, on the knowledge of the practical experience obtained with the German and French plants, and on experience with methyl bromide in general fumigation practice, it is possible to recommend this method with confidence in its efficiency and practicability, and to encourage the wider adoption of the system. A certain amount of equipment is necessary before the technique can be employed in a given silo, and this aspect will be considered first.

Essentially the process is to circulate air containing an insecticidal gas through a long column of grain contained in a sealed silo bin, the circulation being effected by connecting the top and the bottom of the bin by a duct through which the atmosphere is returned by means of a fan to the point of entry.

Construction of the Bin

The main feature of the bin seems to be that it must be soundly constructed of impervious material and must be in good condition. Although a metal bin probably is ideal for the purpose, and was used in the experiments described by Burns-Brown and Heseltine, this form of construction is not essential, and modern concrete silos meet the requirements. Bins of wood or unfaced brick, however, are not suitable. Other important aspects relating to the bin are that it must be sealed effectively at the point where grain is discharged and at the top manhole; in addition it must contain exit and entry points, respectively at the top and bottom of the bin, for the insecticidal atmosphere. These requirements can be met quite easily in constructing new silo bins. With existing bins, however, the methods adopted will vary according to the nature of the construction, the types of delivery chutes, and manholes. Silos abroad have been adapted in this way.

One return duct may be used to serve a number of bins provided that efficient valves are present to shut off the flow from bins not undergoing treatment. The return duct must be of sound construction and not subject to leakages; in addition it should not give too much resistance to the gas flow. For these reasons metal piping of ample dimensions, say 6 in. in diameter as has been employed abroad, is suggested. This has the advantage that standard valve joints and similar piping equipment can be used.

Methyl bromide boils below normal atmospheric temperatures: it is delivered in cylinders and evaporates readily. For this reason there is no need for a special vaporiser, and the dose of liquid may be delivered directly into the air flow. However, an expansion chamber in the circuit, into which the dose can be delivered, is recommended to facilitate the evaporation of the methyl bromide.

Capacity of Circulating Fan

As a minimum limit for the capacity of the circulating fan it is suggested that it be reached by aiming to pass through the particular apparatus every thirty minutes a volume of air equal to that of the empty bin; as the intergranular space in a full bin is only about one-third of the total volume of the bin the actual rate of change would be expected to be greater than this. Fortunately methyl bromide is not inflammable; therefore it does not exact the special precautions necessary with ethylene oxide and similar gases.

The fan and the expansion chamber can be situated together, either at the top or at the bottom of the bins and in a well-ventilated compartment. Preferably this compartment should be separated from the usual working spaces in the premises. It does not seem important whether this compartment be situated at the top or on the ground floor. However, if new construction is contemplated it will often be worth while to include a chamber, of concrete faced brick, in which bagged commodities or empty bags can be treated. In this case the dosing and fan

compartment would best be situated on the ground floor adjoining the chamber.

It should be pointed out that methyl bromide gas is toxic to human beings and that it should only be used if the bins are sound, the piping and other apparatus are carefully installed, and all other safety measures are taken to ensure that workers in the particular premises are not exposed to toxic concentrations of the gas. In this connexion certain mechanical safeguards can be incorporated, such as interconnecting keys which ensure that corresponding valves to bins are operated correctly. Above all it is important to ensure that the operations of the plant are put under the charge of a reliable person.*

Economics of Complete Treatment

With a plant of this type a complete treatment, including the gassing, circulation, standing, airing, and the delivery of the grain, can be carried out in twenty-four hours. The cost also is low, working out to about 5d. per ton for fumigant. This brings the process within the requirements of the large port silos, where treatments could be of major value to arrest the spread of infested grain into the country.

There also seems a good case for mills to be so equipped, especially where there is a large storage capacity. In such cases, particularly where it is the practice to use returned bags, it is a simple matter to add a chamber in which these can be treated as a matter of routine. It is commonly recognised that the reinfestation of flour mills, after fumigations or other insecticidal treatments, frequently is due to insects on returned bags. Therefore the value of such chambers attached to flour mills need hardly be emphasised.

* In this connexion some relevant information may be obtained from the pamphlet entitled *Precautionary Measures with Methyl Bromide*, H.M.S.O., 1947, price 2d., which contains recommendations of measures to be adopted when using the gas as a general fumigant.

This article has been prepared with the knowledge of the Director of Infestation Control, Ministry of Agriculture and Fisheries, to whom thanks are due for permission to publish.

Nutrition Research on Pigs

MORE meat for the consumer and huge savings for the hog raiser are promised by recent chemical research on pig nutrition.

The heavy losses now suffered regularly by the pig industry may be sharply reduced by supplementing the pigs' diet with adequate amounts of nicotinic acid and tryptophan, according to a report presented at an American Chemical Society meeting by Elwood F. Reber, C. K. Whitehair, and Robert MacVicar of Oklahoma Agricultural and Mechanical College.

In the report it is stated that the big economic loss in the pig industry is due to the failure to raise and market a higher percentage of the pigs farrowed. An average of 35 to 40 per cent. of the total pigs farrowed never reaches the market. It is estimated by the United States Department of Agriculture that one-seventh of all hog feed is fed to pigs that never get to market. Production costs on those pigs that do get to market are increased—owing to poor growth and inefficient utilisation of feed.

Causes of Economic Losses

Reports indicate that most of the losses are due to the development of various types of intestinal disturbances, which are responsible for poor growth. It has been demonstrated that tryptophan and nicotinic acid are the nutrients involved in human pellagra. There is also evidence that lack of these nutrients causes intestinal disturbances in pigs.

The pressure of economic production has caused a trend to feed materials such as corn, soya bean oil meal, cottonseed meal, and groundnut meal. In a ration made up of all plant material, tryptophan and nicotinic acid may be limiting nutrients.

In the experiments described, pigs were fed various diets with a basal ration consisting of 83·5 per cent. ground yellow corn, 15 per cent. soya bean oil meal, and 1·5 per cent. mineral supplement. For different groups of pigs, nicotinic acid, tryptophan, and casein were added to the basal ration.

The data obtained indicate that a corn-soya bean oil meal ration containing 14 per cent. protein may be improved for growing pigs by the addition of tryptophan and nicotinic acid and further improved by the addition of casein.

The advantage of the casein supplement may be due to the presence of growth-stimulating nutrients such as a higher level of protein, vitamin B_{12}, or unknown factors. Recent work by the Bureau of Dairy Industry has shown vitamin B_{12} to be present in milk. Supplementing a ration containing a high proportion of corn with skim milk is advantageous.

Balancing the Ration

This work would suggest to the pig raiser that the amino acid tryptophan and the vitamin nicotinic acid may be low in some commonly used rations and that careful consideration should be given in balancing a pig ration with feeds having adequate amounts of these essential nutrients. Since such natural sources as milk and animal by-products are in demand for human consumption, the farmer needs to look for a practical cheap source. One such source may be wheat bran.

Adequate consideration of the critical nutrients tryptophan and nicotinic acid is imperative in developing more suitable rations and thus making the pig-raising business more profitable and less hazardous.

BOOKS RECEIVED

Orders for any of the books listed below or reviewed in this issue may be placed with the Books Department, FOOD MANUFACTURE, *17, Stratford Place, London, W.1. It is regretted that under present conditions it is not always possible to supply books by return of post.*

Freeze-Drying. By Earl W. Flosdorf. Pp. 280 + vii. Reinhold Publishing Corporation, New York, and Chapman and Hall, London. Price 40s.

British Agar in the Food Industry

S. M. TRITTON, M.P.S., F.R.I.C.

In the May, 1949, issue of FOOD MANUFACTURE there was published a description of the manufacture of British Agar. This article describes tests made on this product and gives recipes intended to serve as a general guide to the food manufacturer.

IN FOOD manufacture it is frequently important that the product should set to a gel or jelly, so that any material which can be employed to produce this effect is worthy of full investigation. The best known of these substances is gelatin. Another material which used to be widely employed is Japanese agar, but this is only soluble on prolonged heating and the jellies formed are far from clear.

A product of great clarity, easy solubility, and high gelling power has been developed industrially and is marketed under the name British Agar. This has been produced from a certain variety of red seaweed, the extract of which is purified and stabilised by a patented process. The resulting powder is of high gelling capacity, purity, and of constant composition.

General Properties of Agar

As a preliminary, such general properties as solubility, gel strength of jellies, setting and melting temperatures, and stabilising and emulsifying properties were investigated.

The new product was found to possess real gelling capacity and other additional valuable properties such as quick setting. It dissolves when sprinkled on to hot water, does not require boiling, and, in neutral condition, stands up to temperatures of 240° F. without deterioration.

The temperature of the water used for solution should be between 140° and 170° F., preferably at 160° F. Solution is rapid, and if sprinkled on to water either with rapid stirring or admixed with any sugar needed in the product, clumping should not take place. If clumps do occur, these can be removed by stirring or boiling. At 150° F. the agar stands up well to an acidity of 0·5 per cent. citric acid and, if anything, the slight acidity improves the clarity and setting strength of the jelly, but acid solutions of this agar are decomposed at the temperature of boiling water. The strengths of neutral water jellies at room temperature are:

Per Cent.

1·00 hardly set.
1·25 just set.
1·50 good set.
1·75 to 2·50 very strong sets suitable for decoration, meat pies, and aspic jellies.

For acid water jellies (0·5 per cent. citric acid) at room temperature, the strengths are:

Per Cent.

1·00 hardly set.
1·25 to 2·50 all good sets.

The jellies with higher concentration of agar can be used for the same purposes as mentioned above and will all be slightly stronger than the neutral jellies.

The most useful property of agar jellies is that of quick setting, which makes it of great value in the catering industry, in hot countries, or during hot weather.

Both neutral and acid jellies set at approximately the same temperature, but this must of necessity depend to a certain extent on room temperature. The results of tests carried out at room temperature were:

Per Cent.

1·00	set at	24° C.	(75° F.)
1·25	,,	28° C.	(82° F.)
1·50	,,	32° C.	(90° F.)
1·75	,,	36° C.	(97° F.)
2·00	,,	40° C.	(104° F.)
2·50	,,	43° C.	(110° F.)

In cooler conditions a 2 per cent. agar solution set at 38° C., and a 2·5 per cent. solution set at 41° C.

From these figures it is apparent that even under adverse conditions the set of agar solutions is little affected by temperature, and a refrigerator is unnecessary. The jellies can be melted quite easily by heating to just above their setting temperature and do not need boiling.

Clarity of Agar Solutions

Agar solutions are brilliantly clear if there is a slight trace of acid present and generally clear at jelly strength of 1·25 per cent. or less in neutral solution, but stronger neutral solutions may be slightly hazy, especially when hard water is used in their preparation. As a general rule, if perfectly clear jellies are required there will be acid present, so that this point does not arise.

Effect of Sugar

In connexion with the effect of acid on agar, it should be stressed that in order to prevent deterioration it is only necessary to avoid excessive heating of the agar while in solution and in the presence of acid. An agar solution to which acid has been added just before the setting temperature produces a stable gel. Also, when agar is mixed with sugar and acid in the preparation of jelly crystals, where the acid concentration may be 1¾ per cent. or 2 per cent., dry heat up to 150° F. for one hour was found not to have decomposed the agar. Jellies prepared by dissolving these heated crystals in water at 150° F. retained their normal gelling strength. From this it may be deduced that it should be practicable to pack agar jelly crystals and that these should stand up to shelf condition. It is important, however, that the sugar used be free from moisture and that the package be moisture-proof.

Sugar in an agar gel has a weakening action rather than the reverse. Agar gels which set quickly are somewhat fragile and the more sugar there is present the more

agar will be needed in the jelly. Therefore, if a good gel is obtained with 1·25 per cent. agar in aqueous solution, a minimum of 1·5 per cent. agar is required when the jelly contains 10 per cent. sugar.

Although the water-holding capacity of agar compared with its gelling capacity is less than gelatin, the stabilising effect of agar is such that it can be used to advantage in the preparation of mayonnaises, ice creams, etc.

Agar in Beverages

It has been found that agar can stabilise beverages such as concentrated orange squash or other similar fruit juices, and the amount required will to some extent depend on the squash and its cell and sugar content.

Similarly, the product can be used for the clarification of fruit juices, wines, ciders, and beer. This is a subject which will have to be carefully studied, but the inherent clarity and freedom from taste and odour make it likely that agar will be particularly suitable for such a purpose.

Miscibility with Gums

This agar is also miscible in all proportions with gums and starches. Of the gums tested, acacia gave a clear solution with agar, except for the slightly sandy deposit inherent in the acacia. Powdered acacia may prove useful as an extender for agar. Solutions of tragacanth, locust bean gum, and Algin were all miscible with solutions of agar whether neutral or acid.

Milk Jellies

Agar can be used to set milk jellies, about the same proportion being needed as for water jellies, while the addition of starches or various flours, such as wheat or barley, proved quite practicable. There is evidence that the set of a starch mixture is markedly enhanced by the addition of agar, but both the original set and the amount of sugar present has an effect on the firmness of dessert produced, so that hard and fast rules cannot be laid down concerning the agar content required.

For milk jellies, 1·0 per cent. agar in milk will give a fair set, and the jelly produced will resemble a junket. If it is desired to make a milk jelly shape the sugar content should be kept low, the agar somewhat increased, and extra sweetening produced by the addition of dulcin or saccharin.

In addition, the product can be used in all manufactured foodstuffs, be it bakers' prepared materials or confectionery products such as jubes, marshmallows, and turkish delight.

Agar Desserts

Agar desserts can be produced from a variety of ingredients such as cornflour, various other starches, processed barley flour, rye flour, or wheat flour. Starches will produce a set after the starch granules have been disrupted by heat. If insufficient starch is available and flours are used in desserts, the use of a gelling agent, such as agar, is advantageous. The amount required depends on the set of the dessert, and if an ounce of a dessert powder in a pint of milk produces a soft pudding mixture, then 40-60 g. of agar added to the powder will produce a firm set. It is a matter for experimentation to decide the quantity needed and each case will have to be decided on its merits. It is satisfactory to know that desserts containing agar can be boiled in the usual manner without in any way affecting the gelling qualities of the agar.

Agar in Galantines

The uses of agar in the baking industry are similar to those in the catering industry. In the latter, agar is particularly valuable for its quick set. Galantines, aspic jellies, meat jellies, and cocktail delicacies can all be quickly prepared with agar. A suitable concentration of agar for these purposes is 1·5 per cent., but where it is desired to cut the jellies into various shapes for decorating, up to 2·5 per cent. is advocated. Agar jellies, on account of the rapid setting, will not soak into pastry, and pastry cases filled with such jellies remain firm and dry.

Pie Fillings

Pie fillings are generally prepared from canned or fresh fruit. Generally speaking, an A 2½ can will contain 12-20 oz. of juice and about 1¼-1½ lb. of drained fruit. The fruit is arranged on the pie case, the juice tasted, and enough acid and/or sugar is added to make it attractive in flavour. If sugar is in short supply ½-1 grain of dulcin per pint may be used. If the juice is highly coloured as in the case of raspberries and dark red cherries, the addition of colour is not necessary. When the juice is pale, however, sufficient colour should be added to make it attractive. To dissolve the agar, the flavoured and coloured juice should be heated to about 160° F. and sprinkled with powdered agar. The amount to be used depends on individual taste, 0·75-1 per cent. being suitable quantities.

It is desirable to match the agar to the sugar concentration. With fruit syrups of high sugar content, the agar concentration should be at or above 1 per cent., while with less sugar 0·75 per cent. is adequate.

If fresh fruit is used, it is placed on to the pastry casing and at once covered with a flavoured and coloured sugar syrup containing approximately 1 per cent. agar. The syrup, which should be poured warm, will set on and round the fruit, keeping it firmly in position. In the case of very juicy fruits, such as strawberries, a preliminary coating of the pastry with a little of the jelly before putting the fruit into position is a valuable precaution and will prevent soggy pastry.

Agar in Cake Mixes

The ability of agar to form good emulsions is especially important in cake production where eggs are the usual emulsifier. The normal procedure in cake mixes is to cream the fat and sugar. If the fat used is butter, addition of whole egg may not curdle the sugar batter mix, as butter itself has emulsifying properties. If other fats are used, curdling is likely to take place, and the resulting cake will tend to be heavy.

To prevent this curdling, lecithin

and other emulsifiers have been advocated. Bakers sometimes try to overcome it by adding a small quantity of flour during the creaming process to take up the water which separates during the curdling of the sugar batter. If instead of adding eggs to the creamed fat and sugar a 0·5 per cent. agar solution is first added and beating continued, a very good emulsion is formed which will not curdle when the eggs are added. The agar solution may replace either one-fifth or one-quarter of the egg stock normally used, or some of the milk which would be eventually added to the cake mix. Cakes containing agar are much improved in texture, having a softer crumb and a slightly larger volume if the agar solution is used in addition to the full complement of egg. If 20 per cent. of the egg is replaced by a 0·5 per cent. agar solution, the cake volume will be approximately the same as if the full complement of eggs had been used.

Butter Creams for Icing and Filling

Agar is most effective in helping to produce a smooth and light icing which is easy to apply and pipe, with good setting properties, yet remains soft and attractive to eat and shows no tendency to form hard crystals. The following is a useful formula:

	Oz.
Fat	4
Icing sugar	20
0·5 per cent. agar solution	4

The method of production is to cream the fat with approximately 4 oz. of the icing sugar. Gradually the agar solution is added, allowing each addition to emulsify the fat before adding more of the solution; the remaining sugar is added and creamed.

Marshmallow Production

One method for the production of marshmallow is to boil 7½ oz. of corn syrup, 1½ oz. of sugar, and ½ oz. of water to 240° F., *i.e.* a soft ball. To this is added 3¾ oz. of invert syrup and ¼ oz. of agar dissolved in 4 oz. of water. This mixture is whisked until cool, then the white of an egg is added and the whole whisked until light.

This formula will produce a soft marshmallow such as is used in cake filling. The less water is present the stiffer will be the marshmallow. For marshmallow sweets hardly any water should be used, but the mix must be kept warm during beating and the egg white is preferably whisked prior to incorporating into the mix, which should have cooled a little. Whisking is continued till the mass is fluffy, and the warm mass is at once poured into starch moulds.

Whipped Marshmallow Topping

A fluffy mixture which can be used in a similar way to whipped cream is prepared by boiling 6 oz. of sugar, 3 oz. of glucose, and 2 oz. of water to 240° F., *i.e.* a soft ball. To this is added ⅜ oz. of agar which has been mixed with 6 oz. of tepid water and beaten till lukewarm. After the white of an egg is added beating is continued until light and fluffy. Alternatively, the white of an egg may be whisked with a pinch of cream of tartar until light and fluffy and the boiled sugar/agar mixture, which should be cooled a little, is added slowly with continued whisking.

Piping Jelly

Another useful bakery line is piping jelly. This is produced by boiling 10 oz. of sugar and 4 oz. of water to 240° F. To this 5 oz. of agar solution containing ⅛ oz. of agar is added. This mixture should be kept hot for a few minutes. After removal from the heat and slight cooling, ⅛ oz. of tartaric acid solution is added. This acid solution is prepared by adding 2½ oz. of hot water to each ounce of tartaric acid and the strength is approximately 33 per cent. Colour and flavours should be added at once, the mixture stirred, and allowed to cool. Piping jelly prepared with agar is brilliantly clear and pipes well.

Filling Cream

An attractive filling cream can be prepared from agar by warming ½ pint of a syrup coloured with egg colour; on to this should be sprinkled ⅛ oz. of agar, stirring to dissolve. Then 1 oz. of full cream milk powder is sprinkled on to the syrup. The whole is cooled and whisked until fluffy. Butter and vanilla flavour are added and the cream is used as a filling for cream slices and other pastry goods, or in layer cakes.

Ice Cream

The use of agar in ice cream will produce well-dispersed emulsions of great stability. For a rich ice cream mixture, 12 parts of sugar, 10 parts of fat, and 13 parts of dried milk are mixed with 65 parts of warm water and $\frac{1}{10}$ part of agar. This mix is stirred at pasteurising temperatures and already the agar will exert some dispersing effect. The crude emulsion is homogenised and processed in the usual manner. Less rich formulae make use of the gelling properties of starches, such as cornflour, to give a certain amount of body to the mix. A quantity of agar which may be from 0·1 per cent. to 0·3 per cent. will help in stabilising. If any fat is incorporated the agar will at once assist in its dispersal, but it must be stressed that the agar should be in solution to produce the maximum effect and must therefore be added to the ice cream when this is warm and prior to homogenisation. The agar can be sprinkled on to the warm batch and will quickly disperse. If the batch is not warmed, then a lukewarm 0·5 per cent. solution of agar must be used.

Generally speaking 0·1 per cent. agar is a suitable quantity to add to the batch, and in view of the improved fat dispersion, good texture and overrun are obtained.

A formula for a cheaper ice cream is:

	Parts.
Sugar	12½
Milk powder	15
Fat	2½
Water	70

For such a product 0·2 per cent. agar is a suitable quantity to add.

The Confectionery Industry

Agar is particularly suitable for jelly cubes and has good keeping quality, appearing to dry out less

than gelatin. The confectioner may have to alter his technique of production slightly, as, unlike gelatin confectionery, set is almost immediate. The confectioner will appreciate the enormous saving in time that is effected, which, added to the brilliance of the jellies, must prove of value.

Other sugar confectionery for which agar is suitable is nougatine, fruit centres, and fondants.

In fondant manufacture, the incorporation of a certain amount of agar tends to keep it smooth and soft eating and to prevent the crystallisation which so frequently takes place.

Agar in 0·1-0·3 per cent. solution can with advantage be used in milk shakes to give better foam. It is also useful in various carbonated drinks to help in foam retention and in concentrated squashes to prevent the settlement of fruit cells. It seems to stand up to the acid present in these squashes when added in the cold, and in some cases 0·1 per cent. agar was found sufficient for the suspension of fruit cells.

The possible applications of British Agar are so manifold and so many avenues are open for the development of new and improved agar products that it is hoped the foregoing brief survey will suggest further ideas to the manufacturers of food products.

A Handbook for Analysts

In 1926, Dr. H. E. Cox wrote a small book in the hope that it would serve as a handbook for chemists who had no special knowledge of food analysis, but it has proved so popular that a fourth edition* has now been published.

The volume, which contains a large amount of material in a small space, will save food analysts and others much time in searching the literature, although the author does not claim to have dealt exhaustively with his subject. For those who only occasionally make certain types of analysis this is an advantage, because the author describes in sufficient detail the methods which he employs for particular purposes, and it is preferable to use a method known to be satisfactory in a well-known laboratory rather than to endeavour to make a choice from the literature.

The book is divided into eleven chapters, in which various types of foods are grouped together, usually on account of some common chemical relationship, but sometimes because of the similarity of purpose for which they are intended. Sugars, syrups, honey, jam, and marmalade naturally fall into one chapter, as do wines, British cordials, spirits, beer, cider, and vinegar, but the retention of baking powder, golden raising powders, eggs, and liquid and dried eggs in another chapter calls to mind the days when golden raising powder was sold as egg substitute powder.

The unfortunate system by which in law a cordial is a sweetened alcoholic drink, whereas to the layman it is a sweetened non-alcoholic one, is remembered anew on seeing the word "Cordials" grouped under alcoholic drinks, while lemonade, lime juice, and fruit syrups are classified as fruit products.

In general, Dr. Cox keeps to the title of his volume and avoids expressing an opinion on legal matters, although he mentions such Regulations as the Sale of Milk Regulations, the Milk (Special Designations) Regulations, the Preservatives Regulations, and others in so far as they affect the work of the analyst.

New matter has been introduced regarding methods for the determination of various trace elements in foods; more space has been devoted to the estimation of certain vitamins; and fresh data have been included on baking powders, vinegars, soya meal, onions, meat extracts, sausages, egg products, and other foods. To do this the author has deleted obsolete material, keeping the total number of words in the present volume almost identical with that of the last edition.

It is only necessary to add that few chemists studying for the Branch E examination of the Royal Institute of Chemistry venture to sit for the examination without having studied Cox thoroughly to make those who do not know the volume realise its value as a laboratory handbook. —T. McL.

* *The Chemical Analysis of Foods.* By H. E. Cox, Ph.D., D.Sc., F.R.I.C., 4th Edn. Pp. 340. J. and A. Churchill, London. Price 28s.

Packaging and Display

Designed to cover every aspect of packaging and display, the second edition of an encyclopaedia* presents its information in a manner calculated to stimulate new ideas in both fields.

Special attention is paid to developments which have taken place since the publication of the first edition, notably in packaging for export, in mechanical handling, and in new methods and materials.

Of special interest to the food industry is the section devoted to the quick freezing of foods, their packaging and handling, and their low temperature storage. Thirty-seven pages accompanied by explanatory photographic illustrations are concerned directly with a survey of packaging in the food industry, but there is scarcely any part of this work which does not convey information valuable to the food manufacturer. As an example may be mentioned the 28-page section on packaging for export. In this section are discussed "Packaging for the American Market," "Packaging for the Tropics," and "Packaging for Air Transport."

Forty-one special articles are contributed by well-known authorities in their respective fields.

In all, there are twenty-three sections covering every type of pack and packaging material, and the latest advances made in them, particularly in plastics. There are five indices, including directories of firms and a subject index.—F. E.

* *Packaging and Display Encyclopaedia, 1950.* Pp. 864+xvi. George Newnes, London. Price 63s.

Transporting Quick Frozen Foods

The transport of quick frozen foods presents unique and unprecedented problems. Its first forms of use were crude and inefficient. In most respects it is now past the experimental stage; but, like the industry itself, it is developing rapidly, and new principles and practices are frequently introduced. This article suggests possible improvements in road transport activities and indicates directions in which vehicle builders may look for new users.

THERE are at present two main classes of users of road transport for quick frozen food: the quick freeze processors and the wholesale distributors of the products. The former generally use lorries within the 3 to 5 ton range, carrying large insulated containers, and covering relatively long distances over the greater part of the country. The latter usually serve a limited area within a radius of from 15 to 50 miles and have varying types of delivery vans in operation. These may carry individually insulated boxes or have insulation built into the bodywork.

Growth of the Industry

In the last three years the industry, although still a small one, with widely scattered operating units, has grown with remarkable rapidity. Roughly there are now about 100 quick freezing plants in operation, most of them on a small scale, but within that number are included some half-dozen large processors marketing well-known brands of quick frozen foods which enjoy a nation-wide distribution.

Once the products emerge from the freezer they must be kept at a temperature from zero to −10° F. until they are required for use.

While under static storage they are kept in sub-zero cold rooms, but there are two, and sometimes three, between-stages of distribution to be considered: from the processors' low-temperature cold room to the wholesaler's sub-zero store; from the wholesaler's premises to the retailer's cabinet or caterer's cold room or cabinet. In some instances the products go from the processor's cold room into the low-temperature sections of public cold stores, whence they are distributed to wholesalers or caterers. A few processors have their own low-temperature cold storage depots strategically located about the country.

Owing to the relatively short distances over which perishable foods have to be distributed, the scope for the development of mechanically refrigerated food transport in Great Britain is extremely limited. The development of the quick freezing industry, therefore, found the distributors of these products unprepared with ways and means of conveyance, and there was only one distantly related industry—ice cream—to provide any kind of guidance on the maintenance of low temperature in transit.

A loading bay, with insulated container ready for loading on to a lorry at the quick frozen food plant of Westwick fruit farm.

Photo "The Field."

Use of Insulated Containers

The method generally adopted and still extensively employed, by processors and wholesalers alike, is the use of insulated containers, which are hoisted on and securely fastened to open-sided lorries. This protection by insulation is generally reinforced by use of solid carbon dioxide as a refrigerant, for which bunkers are now generally built inside the insulated compartment.

Solid carbon dioxide, or dry ice, resembles hard compressed snow in appearance, and is actually 144 degrees colder than natural water ice.

Dry ice is far more convenient to use as a refrigerant than water ice, for whereas the latter melts and involves the use of containers for water, dry ice evaporates into a harmless, odourless, non-poisonous, non-inflammable gas, and so long as this evaporation is taking place the cold conditions are maintained.

Built-in Insulation

During 1948 several body builders saw the possibilities for the use of built-in insulation. One wholesale firm, who had been using an insulated container on an open-sided lorry, brought into use an ordinary standard type of Austin delivery van into which had been built an insulated compartment with bunkers for dry ice. This van carries a total load

of 10 cwt. The insulation weighs 1 cwt., thus giving a pay-load of 9 cwt., although during exceptionally busy periods it has been called upon to take 13 cwt. The sides, top, and front are insulated with 2 in. thick kapok, and the base with slab cork.

This smaller vehicle is faster in travel. Being at about the same level as the hand truck upon which the frozen foods are brought from the cold room it takes less time to load, and the lower level also facilitates the removal of the cases of quick frozen food at each point of delivery. It is more easily parked and takes up much less room at the kerbside.

Insulation Developments

Two interesting innovations have recently been made in the construction of insulated compartments for quick frozen food transport. One is a van equipped with 18 insulated lockers, each locker being allocated to a retailer on the day's round who is due to receive a consignment of quick frozen food. The lockers are insulated at top, bottom, sides, back, and front with 3 in. thick expanded ebonite, and a small quantity of dry ice is introduced into each locker. This van delivers over an area of 60 miles, and, as no locker is opened until the shop is reached at which its contents are to be delivered, the products are not subjected to a rise in temperature every time the door of the van is opened.

Another van is divided into three separate insulated compartments, each having its own door, one at the back and one at each side of the van. The body is framed in hardwood built up to form a 3 in. cavity at front, sides, end, and roof, and is lined with aluminium, having joins lapped, sealed, and screwed. The outside panelling is also of aluminium. All the cavities are filled with 3 in. thick layers of Onazote expanded rubber, this insulated material being treated and sealed with bitumastic paint. The doors are specially constructed to exclude all air, and bevelled and rebated to shut securely on an inserted rubber seal.

A Brighton firm have recently put a 10 cwt. insulated van on the road for deliveries in Sussex and metropolitan areas. The insulation of this van is carried out with 2 in. of Onazote for the floor, ceiling, sides, and rear door, and the van has a capacity of 70 cubic feet. With a view to the minimisation of heat losses when deliveries are made, the door aperture is curtained internally. This van has a dry ice bunker fixed to the roof immediately behind the forward bulkhead, and the interior is illuminated by an electric lamp also fitted into the roof. This light is automatically turned on and off with the opening and shutting of the door.

An insulated container fitted with Winget-Dole hold-over plates.

A large insulated container fixed on one of the lorries operated by Smedley's.

Development in the use of self-contained refrigerating equipment on road vehicles in Great Britain seems improbable, mainly because the high costs involved in such small-scale operation of mobile low-temperature plant are at present disproportionate to its advantages, but also owing to the comparatively short routes to be covered. There does seem to be scope for application of the "hold-over" truck plate system (already used to some extent for ice cream transport), particularly by quick freeze processors who wish to ex-

Where non-insulated vans are used, this type of insulated container is necessary.

pand their area of delivery, by means of which the interiors of delivery vehicles can be held at a low temperature for any desired period.

Cold-plate Evaporators

These hold-over plates, more accurately known as vacuum cold-plate evaporators, comprise a flat steel casing or jacket enclosing lines of continuous steel tubing through which the refrigerant passes. Exhaustion of air from the jacket during manufacture causes the plates on either side to be firmly pressed in contact with the refrigerating tubing by atmospheric pressure of nearly one ton per square foot. A solidified eutectic solution (which can be compounded to meet various temperature requirements) is filled into the space under the vacuum, in sufficient quantities to provide the capacity of heat absorption to suit the service required.

The charging of these plates is effected by connecting up with any standard refrigerating system. While the compressor is in operation the solution is changed from a liquid to a solid, and when the insulated area within the truck reaches the desired temperature the compressor shuts off. The hold-over solution then starts to melt and thus takes over the refrigerating work (which in normal static installations would be carried on by the compressor) by absorbing the heat units entering the insulated space.

The normal method would be to connect up the vehicle each night to the refrigerating plant by means of flexible pipes and suitable valves so that the vans are charged in readiness for loading with the quick frozen products and moving off as early as may be desired the next morning.

The plates are made in three thicknesses: 2½ in., 1½ in., and 1 in. They can be installed horizontally adjacent to the ceiling or, with the long edge parallel to the floor, against the walls or across the vehicle.

A possible development is the use of hold-over plates for transport vehicles designed for the delivery of mixed products and thus requiring two different temperatures: *e.g.* quick frozen foods and fresh foods. With the introduction of mobile food shops this seems to have distinct possibilities. The vehicle would require two compartments: the one used for the frozen foods would be fitted with plates filled with a −6° F. eutectic solution, and the one for the fresh foods with plates containing an 18° F. solution.

Milk Powder in 1950

INCREASED supplies of milk powder are being made available to food manufacturers during 1950. Some industries will receive substantial increases over last year's supplies.

Before the war the average annual U.K. consumption of full cream and skim milk powder aggregated 718,000 cwt. and the Ministry of Food estimates that this quantity was utilised in the manufacture of cakes and biscuits, 208,220 cwt; baby and invalid foods, 172,320 cwt.; chocolate and sweets, 150,780 cwt.; ice cream, 64,620 cwt.; and other industries 122,060 cwt.

In spite of an increase in the home production of milk powder, Britain continues to be largely dependent on supplies from overseas. Before the war, imports of full cream milk powder averaged 92,000 cwt. per annum, and of skim milk powder 264,000 cwt. Imports for the past two years have been (in thousand hundredweights): 1948, full cream, 110, skim, 216; 1949, full cream, 209, skim, 699.

Last year's imports were thus substantially higher than before the war. The price of full cream milk powder imports last year was equivalent to 1s. 11d. per gallon of whole milk; and the skim milk powder represented an average of 9d. per gallon of skim milk.

Home production of milk powder, both full cream and skim, aggregated approximately 384,800 cwt. in 1939; 748,800 cwt. in 1948; and 572,000 cwt. in 1949.

Production and Consumption Figures

The total U.K. consumption of milk powder was about 1,160,640 cwt. in 1948 and 1,071,200 cwt. in 1949. The total unrestricted post-war market cannot be definitely estimated at present, but it is expected to be well above the 1948 figure.

The Milk Marketing Board would like to see the home output of milk powder maintained at a high level, mainly because milk so used has a higher realisation price than milk manufactured into butter and cheese.

Hygiene and Food Manufacture

The industrial technologists and those concerned with hygiene approach the problem of feeding the public from different standpoints. If, then, they can agree on measures to be taken for carrying out the objects of the latter without thereby stultifying the activities of the former, it is likely that a satisfactory and thoroughly British working compromise will have been arranged. With these words, Mr. A. L. Bacharach, M.A., F.R.I.C., welcomed his colleagues on the Food Group Committee and the Council of the Society of Chemical Industry in his Presidential Address to the Food and Nutrition Section of the Royal Sanitary Institute's Health Congress held at Eastbourne from April 24 to 28.

THE burden of Mr. Bacharach's address was the necessity for collaboration between food chemists and those concerned with hygiene. With advances in technology, new foods (or modifications of old foods) brought new problems of hygiene. Some of these problems would be foreseen by the food technologist while he was working out the technical processes involved, but others might be unsuspected both by him and by those concerned with public health, and some *ad hoc* measures might subsequently have to be taken to meet the situation.

In general, however, the more regular consultation and contact there was between the two independent groups of experts concerned with making healthy food available to the public, the fewer unforeseen difficulties were likely to arise and the more possible would it be to say in advance what steps should be taken to avoid new risks arising from changes in food consumption.

Importance of Nutritional Value

There was increasing awareness among chemists that the consideration of nutritional value must be paramount in all questions involving the production, manufacture, distribution, and consumption of food, and it was also their concern to make a product that would combine maximum appeal to the palate with an optimum effect on health.

To further this co-operation, Mr. Bacharach mentioned that the Food Group of the S.C.I. and the Royal Sanitary Institute had already discussed the need for drawing up "codes of practice" for the food industry and that machinery for examining this specific proposal would shortly be set up.

Touching upon some of the problems facing FAO, Mr. Bacharach reminded his audience that hundreds of millions of people were living in the world today somewhere between starvation level and conditions of good nutrition, and that the ultimate goal of optimal health for the whole of mankind would require all the resources of science and technology.

Waste must be Prevented

With this goal in view, it became a moral as well as a commercial obligation on the food chemist to prevent waste, not only of foods but of the nutrients contained in them. Those responsible for the maintenance of sanitary conditions in the food industry had to satisfy the food chemist that they were doing no more than was necessary, and that a doctrinaire passion for destroying bacteria was not involving the nation, and therefore the world, in an unnecessary destruction of food values.

Primary Duties of Experts

Many measures advocated as being necessary for destroying pathogenic organisms, or organisms that would make food unpalatable by the production of nauseating if harmless decomposition products, must not only satisfy the hygiene expert as to their efficacy, but must also satisfy the food technologist that they were not overshooting the mark. The primary duty of the hygiene expert was to safeguard the consumer against food-borne infections; for the food technologist it was to safeguard the consumer against dietary deficiencies by the provision of food of maximum nutritive value and palatability.

The concluding remarks of Mr. Bacharach's address were directed towards the question of hygiene among factory personnel and the steps to be taken to guard against the presence of human carriers in food factories.

Bakery Hygiene

In the first of three papers read in this section, Dr. J. B. M. Coppock, B.Sc., Ph.D., F.R.I.C., Director of Research, British Baking Industries Research Association, dealt with the application of the principles of hygiene to the baking industry. This he did under five main headings covering the principles of cleanliness, food legislation, the use of insecticides, the use of detergents, and refrigeration.

He gave the four conditions of cleanliness to be observed by the baker as:

1. Personal cleanliness of all those involved in the handling of raw materials and the baked product.
2. Cleanliness of ingredients and their processing.
3. Cleanliness of the bakery, its plant and equipment.
4. Cleanliness of the shop, its fixtures and fittings.

In developing the application of these four principles there were many other factors to be considered, ranging from the suitability of constructional materials to the toxicology of insecticides and detergents. The industry had constantly under review the measures to be undertaken to eliminate ingredient and product contamination by insects or rodents and to prevent the

development of mould or bacterial contamination. Dr. Coppock outlined the various methods employed to circumvent these evils and stressed that the most important point was the systematised training of factory operatives. In this connexion he mentioned that all the bakery trade associations were considering the question of hygiene education and that the National Board of Bakery Education had set up a committee to consider how best the subject might be taught to its employees.

Practical Approach Necessary

Many of the points raised by the speaker are already the subject of various by-laws, and before new laws are drafted he considered that further thought should be given as to whether we were going faster than the state of scientific knowledge warranted and whether a sufficiently practical approach was being made to the problem of the provision of a clean baked product.

As the chairman had pointed out, there was a grave danger of too academic an approach defeating the whole objective of producing clean food; the production of food under the conditions of sterility of the operating theatre was an absurdity which was more likely to lead to mass starvation than to the production of clean, wholesome baked goods. While agreeing that all possible steps should be taken to prevent the consumer from ingesting contaminated food, he appealed to all those who had the interests of clean food production at heart to examine the problem in the light of what could be done on a production unit and achieve codes of practice which were both practical and logical.

Insecticides and Detergents

On the use of insecticides and detergents, Dr. Coppock described experiments carried out with DDT, the results of which led to the conclusion that this form of pest control should be used only if all ingredients were removed from a bakery undergoing fumigation and provided all items of plant or equipment coming into contact with doughs, batters, etc., were covered and subsequently cleaned. Similar problems were raised by the use of detergents in washing operations and the problem of adequate rinsing of utensils so treated was one which still required careful study.

There also existed a need for scientific discussion on the use of refrigeration for food storage lest those who regarded refrigeration as a panacea against all food evils tended to lose sight of the occasional extraordinary powers of multiplication certain organisms commonly present in foods possessed after being stored under cold storage conditions.

Hygiene and Canning

The growth of the industry was described by Prof. E. L. Crossley, B.Sc., F.R.I.C., Professor of Dairying, Reading University, in his paper on factory hygiene in the canning industry. After outlining the sequence of processes, the different types of heat-resistant organisms, and the factors affecting the efficiency of heat processing, Prof. Crossley spoke at some length on bacterial contamination which might be derived from the raw materials used or added as a result of contamination during handling. To some extent the flora of the raw materials was outside the control of the canner, but he could insist upon freshness and avoid the use of any material showing the slightest sign of decomposition.

Another essential step was to oppose by every possible means the common attitude of mind which placed complete trust in the sterilising process to the neglect of preliminary hygienic precautions. Previous washing of the ingredients in running water was essential and manual handling of food should be avoided whenever possible. Where this was impracticable, as in the cutting and trimming of carcasses, insistence upon personal cleanliness and disinfection of the hands were obvious precautions.

Care should be taken to minimise contamination from the surfaces of equipment, and methods which had become standard practice in the dairy industry appeared to be applicable to canning. It was unfortunate that too little attention was often given to ease of cleaning and sterilising in the design of canning machinery.

Prof. Crossley described methods of sterilising the different types of equipment, with particular emphasis on the smaller item which was apt to get overlooked.

It was equally important to avoid all procedures which encouraged the proliferation of bacteria before the food could be sterilised and the retention of food in cold storage until required for canning was advocated. Other methods of preventing bacterial development were described, and Prof. Crossley concluded his paper by stressing the need for a control laboratory in every canning factory. Much progress had been made in devising laboratory control schemes to ensure adequate processing, detection of faulty sealing, and bacteriological examination of every batch of canned food, although further work might be undertaken to improve the general hygiene of preliminary processes and to check the sterility of all equipment.

Meat Products

The practical aspects of hygienic control in the meat products factory were the subject of a paper read by Mr. F. R. Gerrard, M.Inst.M., Acting Principal, Smithfield College of Food Technology, who outlined the general methods employed in the preparation of some meat products, stressing the importance of the state of the raw material and its effect on the finished product.

Discussing the raw materials, he pointed out that, with the exception of a few who slaughtered their animals on their own premises, the condition of the animal prior to slaughter, the slaughter technique, and the subsequent handling and transport of the carcass were beyond the manufacturers' control.

In addition to the main raw material—meat—Mr. Gerrard described the proper handling of by-products such as maws (pigs'

(*Concluded on page 241*)

Efficient Operation of Drying Plant

Part IV

LEO WALTER, A.M.I.Mech.E., A.M.I.Plant E.

In this survey the author deals with the thermal efficiency of steam-heated driers, and shows how a comparison between actual cost figures per lb. dried product and top efficiency figures will reveal the financial losses encountered from overall inefficiency. Steam and fuel costs figure prominently among financial losses and are usually the items for which the exact figures are seldom known.

THE usual criterion of thermal drier efficiency is the term "lb. of steam per lb. of moisture evaporated"; this is not fully correct, because it does not take into account either steam pressure or quality of fuel from which steam has been generated. The better term would, therefore, be "B.Th.U.'s per lb. of moisture evaporated."

Two ways are open for a works engineer to arrive at reliable steam consumption figures: by measurement of steam or condensate from heating surfaces or by simple calculation. In the measurement of condensate, flash steam has to be taken into account, *i.e.* the weight of evaporated condensate which forms when "superheated" water is released from a condensate line to the atmosphere, the weight of which has to be added to the weight of liquid condensate.

For convenient measurement, a new low-priced steam meter is now on the market; based on differential pressure measurement from an orifice inserted in the steam supply line, this instrument works on the manometer principle.

Comparing Drier Efficiency

It is not the total steam consumption of two identical machines which indicates thermal efficiency, but the amount of moisture evaporated per lb. steam, of same pressure and dryness fraction. For example, where the moisture in the material entering and emerging from the drier, the weight of dried material per hour, and steam consumption in lb. per hour are known, then the weight of bone-dry material obtained per hour is:

$$\frac{100 - \%\text{ after drying}}{100} \times \text{weight of dried material/hour.}$$

Lb. of moisture evaporated per hour is:

$$M = \frac{\%\text{ moist}}{(100 - \%\text{ dry})} \times \text{weight bone dry.}$$

The weight of steam per lb. moisture evaporated is then:

$$\frac{\text{Steam consumption}}{M} \text{ in lb.}$$

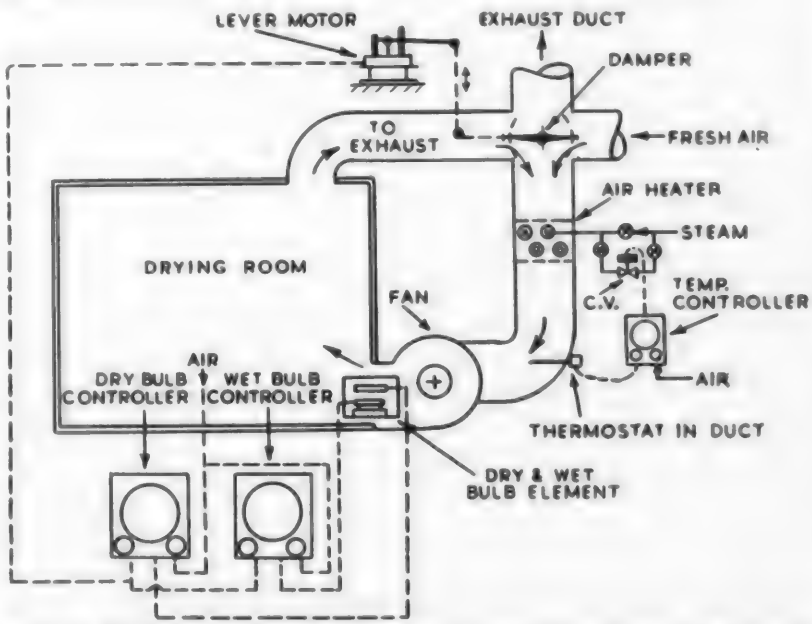
To improve the efficiency of hot air driers, all external surfaces should be insulated to prevent heat losses. The temperature and humidity of air and also air velocity should be measured at different points in the machine. Faults may become apparent in heat distribution, in too low humidity content of exhaust air, or as a "dead" corner. Utmost cleanliness of the outer and inner surfaces of heating coils must be secured, and efficient removal of condensate and air should be carried out. Tests will reveal the best applicable air volume and speed.

Sometimes changes in the speed of the fans might not cure trouble, and a complete change of the size of the fan may become advisable. Where high air temperature and low humidity of exhaust are known to be present, the use of recirculation of air should be compulsory. Automatic temperature and humidity control should remove the vagaries of the human element.

General Principles for Drier Control

Summing up, the guiding principles for plant control in general should be as follows:

1. Smooth running of plant equipment under all possible working conditions. Wherever possible, external process characteristics should be made favourable.



Increased efficiency of drying room is achieved by combined temperature and humidity control (wet and dry bulb method).

2. Use of small pressure drops across control valves, based on well-sized pipe diameters.

3. Simplicity in plant layout in general and the use of the simplest possible controller types. Where, however, process characteristics warrant elaborate controllers, these must be installed.

4. Moderate claims for accuracy of control on part of the users. Exaggerated claims would only lead to trouble, if controllability of process is low.

5. Straightforward installation of controllers, with easy accessibility for mechanism, valves, and auxiliary control equipment. Use of alarms.

6. Utmost care in proper maintenance of control equipment. Frequent checking of instruments, and "preventive" maintenance and overhaul at regular intervals.

Heat input into a drying room or apparatus is used: (*a*) to warm up the goods to be dried; (*b*) to supply heat required for evaporation of moisture from the goods; (*c*) to replace heat lost when warm goods leave the drier; (*d*) to replace heat lost in exhaust air; (*e*) to replace heat lost in condensate; and (*f*) to replace heat lost by radiation from drier surfaces, by leakage of hot air, and other causes. Heat required for the evaporation of moisture from the goods (called the effective heat) may range from 40 per cent. to 70 per cent. of the total heat input. The sensible heat utilised for warming up the goods may range from as little as 3 per cent. to 25 per cent. Heat losses can range from 15 per cent. to 50 per cent. of the total heat input.

The amount of heat required for warming up a certain weight of air is:

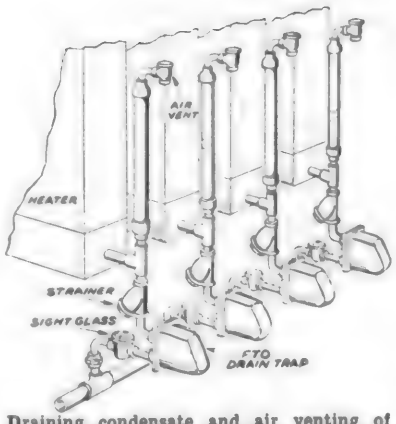
$$H = W\,(t_2 - t_1) \times S.$$

In this formula, H is expressed in B.Th.U.'s, S is the specific heat of air in B.Th.U./cu. ft. °F. (as a rough average 0·24), t_2 is outlet air temperature, t_1 is inlet air temperature in the heater in °F.

In order to transform weight of air into the air volume at a certain temperature, the following formula can be used:

$$\text{Weight of 1 cu. ft. in lb.} = \frac{40}{\text{°F. absolute.}}$$

$$\text{Or vol. cu. ft. at °F.} = \frac{\text{Weight} \times \text{°F. absolute}}{40}$$



Draining condensate and air venting of sections of heater battery on hot air drying apparatus.

Photo Spirax Manufacturing Co.

To obtain a rough estimate of the air volume required for theoretical evaporation of a given quantity of moisture, inlet temperature, humidity, and corresponding outlet figures have to be known or assumed. Under average conditions, fresh inlet air can be assumed to be at 60° F. and about 40 per cent. relative humidity. The calculation for hot air drying is then based on the amount of moisture to be evaporated by correct rate of heat input, and to be carried away by the right amount of air.

Calculating the Heating Surface

Assuming that the amount of heat required is known, and a steam pressure and temperature are chosen which provide a temperature differential between drying temperature and steam temperature, the heating surface can be calculated. This will depend on air quantity and velocity, and on heat transfer through the heating coil. The coefficients for heat transfer from steam to air are given for each type, size, and quality of pipe. For example, 3 B.Th.U. per sq. ft. coil surface per degree F. temperature difference per hour may be assumed for very low air velocity in a drying room.

The overall thermal efficiency of a hot air drying plant, based on fuel consumption, can be expressed as

$$E = \frac{\text{lb. evaporation} \times \text{latent heat}}{\text{lb. of fuel} \times \text{calorific value}}$$

which is the ratio between useful heat input to heat requirements.

The following figures are given for rough estimates in the ASHVE guide: air temperature will drop approximately 8·5° F. per grain of water evaporated per cu. ft. of air (measured at 70° F.). Measured at any temperature, the temperature drop will be about 0·62° F. per lb. of air per grain of water evaporated. For each B.Th.U. extracted, air temperature will be reduced 55° F. per cu. ft. In one passage, air will generally absorb from 2 grains to 5 grains moisture per cu. ft. For rough estimates of steam consumption, 2½ to 3 lb. of steam per lb. of evaporated moisture can generally be assumed.

Progress in Drier Design

Generally speaking, modern hot air driers and contact driers (roller or cylinder) have made great progress during the last twenty years. Nevertheless, there are still many of the older types in use in the food industry, most of which seem to be ripe for the scrap heap, mainly because they waste heat and steam, and do not produce goods of uniform quality.

It has also been observed that the temptation to build "home-made" driers is sometimes succumbed to in the food industry. Home-made drying rooms or hot air driers are seldom efficient, and rarely incorporate those scientific principles which designers of modern specialised plant use as a matter of routine. For example, older driers have often no means for air venting the heating pipes or air heater batteries, and they either apply the wrong method of steam trapping or use group trapping instead of individual trapping of each section of a heater battery.

Measuring Devices

Similarly, measurement of drying efficiency is still in its infancy in many instances, and measurement of moisture content of goods before and after drying is not always performed as frequently as is desirable for high efficiency of drying with low steam consumption and uniformity of the dried foodstuff. This applies especially to continuous driers using conveyor bands, where the ideal condition

would be to have the moisture content of the product continuously recorded on a moisture meter.

The development in textile drying of such a meter consisting of an electronic device with two electrode plates arranged to form an electrical condenser, and an electronic hygrometer giving a continuous indication, whereby no parts need to come into direct contact with the fabric, has not been utilised to a great extent in the food industry. The ultimate target would be to utilise this continuous measurement of moisture content for automatic regulation of the conveyor speed, thus adapting the rate of drying at any moment to the actual moisture content of the foodstuff leaving the continuous drier.

Similarly, for a cylinder drier, steam pressure and roller speed could be automatically adjusted at any time.

Spray drying and vacuum drying are also coming into much wider use, although the high cost of these types of drying equipment delays their general adoption.

(*To be continued*)

Hygiene and Food Manufacture

(*Concluded from page 238*)

stomachs), chitterlings, and pigs' feet. Spices were used in many manufactured meat products, and there was a widespread belief among practical men that these acted as a preservative, but this was probably due to the fact that heavy seasoning tended to mask taints in food. In view of the possible bacterial contamination of spices, a greater use of essences would be preferable.

Mr. Gerrard discussed the manufacture of fresh sausage and cooked products in some detail, with particular emphasis on hygiene. He gave practical details of the most suitable type of equipment and of the *modus operandi* of cleaning it. As had been stressed by the previous speakers, he recognised the importance of the operative as a link in the hygienic chain. This link could be strengthened by education, training, and suitable incentives in the matter of working conditions.

Cider Manufacture

DURING the last few years the reviewer has received several books, mostly from France, dealing with various aspects of the fermentation industries, and has been disappointed to find that they have been either reprints of books published some years ago or based on work performed some years earlier. It was, therefore, with real pleasure that he opened a book* by Dr. Charley on cider making. With Dr. Charley's experience at Long Ashton a really scientific volume by a British expert was hoped for, and it was regrettable to find Dr. Charley following the footsteps of so many others.

Dr. Charley has, in fact, with the assistance of Miss Mumford, translated *La Cidrerie* by Prof. G. Warcollier, who wrote the third edition in 1928. Dr. Charley has added short notes of his own at the end of each chapter to bring our knowledge up to date with the qualifying statement that it would have been improper to introduce too much new material into Prof. Warcollier's work and that he does not wish to steal the thunder of anyone wishing to produce an entirely new English textbook on cider making.

Dr. Charley has been too modest; he would have performed a better service to British cider manufacturers if he could have been persuaded to produce an entirely new book, basing it on a translation of Prof. Warcollier's work, which was written from the standpoint of the cider manufacturer as an artist, although the transitional stage to cider manufacture as a science may be seen in his work.

There is much material which could have been edited with advantage from the scientific standpoint some twenty years later. In 1928 the study of hormones and enzymes was in its infancy, the importance of penicillin had yet to be discovered, streptomycin was a thing of the future. We know of no one more competent than Dr. Charley who could have produced the entirely new book to which he refers and in which he could have given us the results of this scientific knowledge superimposed on the age-old art of cider fermentation.

In view of the stimulus given to cider manufacture in Great Britain during the war, this book will be invaluable to manufacturers and to those advising them, because it is a practical work. There is no book in the English language, as far as the reviewer knows, in which the various stages of cider manufacture are described in so much detail. The illustrations which have been introduced add considerably to its value.

Owing to the difficulties of translation and of conversion from metric to Imperial measures, some mistakes have crept in. For instance, we are informed (page 289) that the potential alcohol by volume of a cider may be calculated by subtracting 0·1 from the percentage of sugar and multiplying by 0·06. This should have been 0·6. In Great Britain it is also customary to employ standard methods of laboratory analysis rather than to rely on the various techniques proposed by the house of Dujardin-Salleron, excellent though they may be.—T. McL.

* *The Principles and Practice of Cider Making.* By V. L. S. Charley, B.Sc., Ph.D. Pp. 367+xvi. Leonard Hill Limited, London. Price 35s.

Our Contemporaries

THE first part of an article describing the clove industry of the Zanzibar Protectorate, its history, and general circumstances appears in the April issue of *World Crops*. In the second part of this series, published in the May issue, the author deals particularly with the "Sudden Death" disease of the clove tree which has wrought havoc in clove plantations and baffled investigators for nearly forty years. He also discusses questions connected with the marketing and disposal of the clove crop. Other articles in this issue deal with the control of cocoa diseases in West Africa, the French and North African olive industry, and the sugar cane. This latter article provides a summary and review of the world's sugar supplies.

The Nutritive Value of Bread

In the third of the three Cantor lectures delivered before the Royal Society of Arts, Dr. D. W. Kent-Jones, Ph.D., B.Sc., F.R.I.C., discussed the nutritive value of different types of bread.

IN VIEW of the importance of bread in the modern diet, much attention has been paid in recent years to the question of the nutritive value of bread of various types. This immediately raises the old problem of the relative values of white flour and of darker flour made by incorporating into the flour sack a higher proportion of the grain than is the case with white flour. A great deal has been written on this subject and the arguments put forward by the advocates of white flour and of the darker flour have been forcible. Because of this the importance of the outstanding nutritive value of any type of bread, whether white or brown, is apt to be overlooked.

White *v.* Brown Flours

The controversy concerning the relative merits of white and darker flours has gone on for many years. It was intensified with the introduction of the gradual-reduction milling system. In earlier days the controversy was fully set out by Jago in his classic work *Technology of Breadmaking*, and it will be seen that in those days the main bones of contention were: the relative calorific values of the various types of flour and the bread made therefrom, and the digestibility of the carbohydrates and of the proteins of the various types of flour.

It is now known that these are by no means all the important factors which have to be considered. In fact, the difference in calorific value between white and "brown flour" is relatively slight. It is further now well established that the digestibility of the carbohydrates and proteins in bread is reduced as the extraction is increased although, important though this point may be, possibly it has been overstressed. Whether the proteins from long-extraction flour have a higher biological value than those of white flour is a subject which has received attention. The bulk of evidence points to this being so, but the most recent evidence suggests that this factor has been overstressed through incorrect interpretation of the results, which can be misleading unless studied statistically.

Insufficient attention was paid in the early days to the fact that bread was not normally eaten by itself but with other foods, but the discovery of the vitamins of the B complex gave the critics of low-extraction flour a new lease of life, since the exclusion of the germ and much of the bran did result in the flour having a low vitamin B content. It is now admitted that undue emphasis was placed on the presence of the germ, since we now know that this was not the portion of the grain which was the fraction rich in vitamin B_1.

In recent years much has been learnt about the distribution of the vitamins of the B group in the grain, and hence in various types of flour, and gradually the position has become less obscure. The exceptionally rich B_1 content of the scutellum (1½ per cent. by weight of the grain, but containing 60 per cent. of the total B_1 of the grain) was an important discovery; and, now that most of the vitamins of the B group can be assayed with more precision than was possible a few years ago, the position has clarified. In fact, it might be said that the controversy today is no longer between the relative virtues of white flour as it was and wholemeal.

Less Advocacy for Wholemeal

Both schools of thought have, in the light of modern knowledge, tended to modify their original points of view. There is less advocacy for wholemeal as the preferred form of bread for many reasons, such as its general unpopularity, owing to lack of palatability, the presence of much fibrous matter which interferes with digestibility, and the high phytic acid content which may cause a shortage of calcium in the diet. In addition, the poor keeping quality of wholemeal bread and its general unhygienic nature must be borne in mind.

Milling Techniques

Attempts are now being made, by milling under certain conditions to 80 or 85 per cent., to obtain most of the advantages of wholemeal without some of its nutritional defects. Flour of 85 and certainly flour of 80 per cent. extraction is much more acceptable to the public than true wholemeal. The colour is reasonably good and the loaves bolder and generally more pleasing. Nevertheless an appreciable vitamin content is retained and a strong case can be made out on general nutritive grounds. On the other hand, the white-flour school have argued that since there are so many advantages in retaining white flour there is virtue in keeping this type of bread, provided the comparative lack of certain vitamins of the B group can be compensated.

This is now possible by the addition to white flour of small quantities of synthetic vitamins of the B group. It is argued that such a scheme would give the population all the essential nutrients they received from darker bread, but would also ensure that they had bread of the appearance, flavour, and character for which they have expressed a marked preference. The choice now, therefore, is between 80 or 85 per cent. extraction bread and white bread of about 72 per cent. extraction, fortified with such synthetic vitamins as B_1, riboflavin, and nicotinic acid.

In recent years there has been a flood of information concerning the quantity of the various B vitamins in flours of different extractions. Naturally there have been certain discrepancies in the figures which have been published, but

those given in the table are believed to be correct and generally accepted. Naturally the figures are open to some variation since different wheats have different amounts of vitamins.

It has been difficult to give exact figures for available calcium and iron, especially with the longer-extraction flours. Published figures are conflicting, but it is now generally agreed that, if the diet consists principally of wholemeal bread, there is a definite negative balance for calcium and it seems probable that the same applies to iron. Thus it is difficult to get exact figures for available iron and calcium for the longer-extraction flours generally, since these are not obtainable from analysis and those quoted must be accepted with some reserve.

Vitamin Content of Flour

On the other hand, with respect to the vitamins, the figures would appear to be reasonably correct for B_1, riboflavin, and nicotinic acid, especially as certain earlier and less reliable results have been disregarded. The figures for pantothenic, pyridoxin, and biotin are probably less reliable, but there is not much doubt about them. The important point is the extent to which the various components of the B group are present in flours of different extractions; and it is useful to note that the distribution of many of these vitamins in the grain, and in flours of different extractions, is quite different from that of vitamin B_1.

It may be argued that even if there is only a slight advantage with respect to the amounts of certain vitamins in increasing the extraction, this policy should be followed. However, a number of important practical factors have to be taken into consideration.

For example, people who are big bread eaters generally do not like bread made from the darker types of flour and are quite prepared, whether it is in their own nutritional interests or not, to pay an appreciable premium for white bread made from lower-extraction flour. This is shown by the fact that much more money is spent advertising brown breads than white breads, and yet brown bread constitutes only some 6 to 7 per cent. of the total bread consumed.

In Switzerland, the Government attempted to popularise a bread made from 85 per cent. extraction wheaten flour with the addition of 20 per cent. rye, and by law it was retailed at a price less than the normal white bread. For a month or so the sales were considerable; but they soon lapsed, even though an attempt was made to keep the darker loaf popular by a further subsidy.

From the point of view of purity and freedom from extraneous dirt, including rodent faeces and insect fragments, white flour is undoubtedly definitely preferable to the darker flour. Long-extraction flour does not store well, especially when the climatic temperature is on the high side; indeed, in certain regions it would be ludicrous to mill long-extraction flour unless it could be used almost immediately, which under modern conditions is rarely the case.

Bread Staling and Diseases

One disadvantage of bread made from long-extraction flour is that it stales more rapidly than bread made from shorter-extraction flour and this generally results in serious wastage of food. The extent of such wastage may be very considerable; and in addition bread diseases, such as rope and mould spoilage, which can be serious, occur more frequently with the darker types of bread. It must not be assumed that the use of flour of low extraction is as uneconomic as it may appear at the first glance, since it permits the production of appreciable quantities of animal feedingstuffs which are used for the production of "protective" or vitamin-rich foods, such as milk, eggs, and meat.

Case for Enrichment

In spite of the fact that modern enrichment provides the public with white bread of the appearance and taste they demand, but which contains high quantities of the principal B vitamins, yet strenuous objection is still made by certain authorities. It would almost seem as if the brown bread school were more interested in ensuring that people had no choice in their bread than that it should be rich with respect to certain essential B factors. The case for enrichment was discussed by the author before the Nutrition Society on February 24, 1945. The matter was also fully discussed by the U.S. National Research Council in their pamphlet *Enrichment of Flour and Bread*, 1944.

The bulk of the evidence from America, where the enrichment policy has been pursued for many years, shows that it has been highly successful and has probably been a major factor in im-

COMPOSITION OF FLOUR OF VARIOUS EXTRACTIONS

(per 100 g.)

	Patent flour (about 50% extraction).	*Straight run (about 72% extraction).*	*Straight run (enriched).*	*75% Extraction.*	* *80% Extraction (7 oz. per sack creta praeparata).*	* *85% Extraction (7 oz. per sack creta praeparata).*	*Wholemeal (95%-100%).*
	%	%	%	%	%	%	%
Protein ..	10·0	11·0	11·0	11·2	11·4	11·6	12·0
Available iron (mg.)	0·9	1·0	3·0	1·1	1·8	2·2	2·7
Available calcium (mg.) ..	15·0	18·0	22·0	22·0	57·0	50·0	Negative
B_1 (mg.) ..	0·08	0·11	0·50	0·15	0·26	0·31	0·40
Nicotinic acid (mg.)	0·70	0·72	4·0	0·77	1·20	1·60	6·0
Riboflavin (mg.) ..	0·03	0·035	0·30	0·04	0·05	0·07	0·12
Pantothenic acid (mg.)	0·4	0·6	0·6	0·75	0·9	1·1	1·5
Pyridoxin (mg.) ..	0·1	0·15	0·15	0·2	0·25	0·3	0·5
Biotin (mg.)	0·0005	—	—	—	—	—	0·007

* With the long-extraction flours there has sometimes been no enrichment with calcium and sometimes there has been an addition of 7 oz. per sack and sometimes 14 oz. per sack. For the purpose of this table the middle figure has been used.

proving the health of the nation. It is, of course, impossible to be too precise since so many other factors have to be considered. Certainly Dr. Jolliffe, who testified at the Public Hearing held at the War Food and Administration in January, 1943, was of the opinion, from his experiences in hospital, that there had been a marked decrease in certain diseases such as florid beri-beri and florid pellagra. This view has been confirmed by controlled experiments in other places such as the Mayo Clinic.

Arguments against Enrichment

There seem to have been only two worth-while arguments advanced against the enrichment policy. The first questions the justification of a process of milling flour in such a way as partially to exclude certain vitamins which are then replaced by the addition of "synthetic" vitamins. The answer to this is that it is the only way in which the people can be provided with the type of bread they demand while at the same time ensuring that it has certain nutritional virtues. If people were content to consume darker breads, with their generally higher vitamin content, there would be no need to consider the enrichment policy.

Secondly, it is sometimes argued that under the enrichment policy some, at present unknown, but essential, factors may still be excluded, but the experiments in America suggest that there is no danger from the enrichment policy. It seems extremely unlikely that the use of white bread enriched as in U.S.A., in place of bread made from 80 or 85 per cent. flour, could possibly prejudice the consumer even when the diet is a poor one. It is not likely, to say the least, that after all the intense work which has been done in this field such a scheme could result in an insufficient intake of an important member of the B group.

Answers to Criticisms

It is not possible to answer every form of criticism since it is impossible to make precise and exact experiments, uninfluenced by other factors. Nevertheless, writing in 1947, the author stated that considerable guidance on this problem might be obtained from what was described as the Newfoundland experiment. There had been malnutrition in Newfoundland, undoubtedly owing to an insufficiency of the vitamin B factors, and a party of international nutritionalists made a thorough survey. Some improvement occurred with the introduction of darker bread, but, as usual, this was not popular. It was then decided to make compulsory flour enriched to the U.S.A. standard, and after some two years a further survey was made by the visiting nutritionalists. There was no doubt about the improvement in health which resulted from this policy.

Token Nutrients

The discussion of the question of the relative nutritional values of enriched white bread and bread made from longer-extraction and darker flour would be incomplete without mention of the Government White Paper on this subject issued in 1945. This gave the findings of a Committee which consisted of representatives of Ministries, such as the Ministry of Health and the Ministry of Food, the industries concerned, namely, the millers, bakers, and flour importers, and other bodies, such as the Medical Research Council.

The Committee discussed the problem between themselves and did not hear any evidence. They recognised the public preference for a whiter type of flour, but insisted that, whatever the nature of the flour, it should contain definite quantities of nutrients as follows:

	Per 100 g. of flour.
Vitamin B_1 ..	0·24 mg. (corresponding to 0·80 i.u./g.)
Nicotinic acid	1·60 mg.
Iron	1·65 mg.

It was considered that these minima of "token nutrients," as they were called, could be supplied by 80 per cent. extraction flour. A study of the report makes it clear that no reference was made to riboflavin in the "token nutrients" simply because it did not fit in with the preconceived idea of recommending an 80 per cent. extraction rate. Obviously if riboflavin were to be excluded because of the claim that this would be provided by other portions of the diet, the same argument could have been extended to nicotinic acid or even B_1. It might further be argued that the standards advocated in the White Paper were lamentably low compared with those achieved by the U.S. enrichment policy, but they were the highest possible consistent with 80 per cent. extraction.

Losses in Cooking

It must be pointed out that not only might the standards be considered low, but that the Committee seem to have made no allowance for the destruction of vitamins in cooking. Taking food generally, probably approaching 40 per cent. of the B_1 of the food is lost in cooking, and this point was conveniently ignored, although the losses in baking are less severe.

Scientists generally will feel uncomfortable on reading one statement in the White Paper: "There is a strong *prima facie* case for thinking that the vitamins in the wheat kernel exist in the form of a balance which has proved to be conducive to health, and therefore much caution is called for before starting upon a new line of action which might upset that balance with deleterious effects." Seeing that the White Paper was advocating an 80 per cent. extraction which has a completely different balance in the B vitamins from a 100 per cent. extraction flour, arguments seem ridiculous.

Practical Difficulties

In their endeavour to justify an 80 per cent. extraction, the Committee ran into a number of practical difficulties. For example, native English wheat used in an appreciable proportion by the small country millers is generally lower in vitamin B_1 than the strong imported wheats. If, therefore, they have to mill to an extraction to obtain the "token nutrients," this might mean they would have to mill slightly darker flour than the port millers. The effect is likely to be that they would soon

be put out of business and this would cause difficulties to British agriculture. In consequence of this and other problems, the Committee recommended further study into the following questions:

(i) How low - extraction flour suitably reinforced with the "token nutrients" compares from a nutritional point of view with high-extraction flour obtained wholly from the wheat grain. In this connexion consideration will have to be given to information which may be available as to the results of the widespread use of reinforced flour in the United States.

(ii) Whether methods can be devised for determining by examination of flour whether the quantities of the "token nutrients" contained therein have been obtained wholly from the wheat grain or have been added to the flour. It is agreed that this determination is not practicable at present.

(iii) Whether, given such methods, effective procedure could be devised for enforcing high extraction for flour to be used for bread while permitting low-extraction flour to be used for other purposes.

(iv) Whether the position of country mills dependent wholly or largely on locally grown wheat could be safeguarded if they were required to produce flour containing the prescribed minimum quantities of the "token nutrients" without reinforcement.

(v) Whether it is possible to determine which varieties of home-grown wheat are best suited to produce flour of good breadmaking quality containing at least the prescribed minimum quantities of the "token nutrients," with a view to the increased use of such varieties by farmers in the United Kingdom being encouraged as far as practicable.

(vi) Whether the co-operation of the Governments of the principal flour exporting countries, *e.g.* Canada and Australia, could, if necessary, be secured in enforcing a high rate of extraction and prohibiting reinforcement for flour to be exported to the United Kingdom.

In conclusion the report stated:

It will be a matter for the Government to decide in the light of the results obtained from studies such as are suggested in the previous paragraph and all other relevant considerations, including the attitude of the public towards bread made from 80 per cent. flour, whether it will be both practicable and in the national interest to prohibit, or alternatively to permit, the manufacture and sale of low-extraction flour which has been reinforced by added vitamins. The Committee are unanimous in recommending that in the meantime the present National flour should be maintained.

(*Concluded at foot of next columns*)

It is, indeed, difficult to see why people should not be given a choice in the nature of their bread, when, at the most, there can be very little difference in the nutritive value. All bread is of high nutritive value and, if the natural habits and the strong feelings of the mass of the people favour white bread and especially if the nutritive value of white bread can be enhanced by an enrichment policy, it is difficult to see what real objection there can be to this procedure.

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Canning in Western Germany

PROSPECTS for Western Germany's canning industry are not regarded as unfavourable for 1950. Consumers are once again insisting on quality, and considerable progress, as a result of the establishment of a testing institute at Hanover, has been made in this direction over the past year, although standardisation and the branding of products still leaves much to be desired.

The past year is viewed with rather mixed feelings, as the industry was beset by a number of major difficulties which prevented it from taking full advantage of the improved supply of raw materials and the more prosperous condition of the German economy as compared with 1948. The most important handicap was shortage of capital, which decimated all reserves, and which was particularly serious for the canning industry with its slow turnover of capital.

Considerable quantities of hoarded stocks were unloaded into the market last year, the mild winter of 1948-49 having slowed sales. The supply of cans also presented some difficulty, particularly earlier in the year.

While the financing of 1949 vegetable and fruit crop purchases was made possible to a large extent by short-term advances from banks, they were not prepared to grant long-term investment credits which would have made possible a rationalisation of operations and a reduction in prices. At the same time, competition from both domestic and foreign producers became increasingly keen.

The price factor is assuming increasingly large importance and, with the general supply of food on the German market now adequate, is held to be the key to the future development of sales. It is pointed out that while demand for specialities and *delicatessen* is on the increase, the industry will have to rely for the bulk of its sale on staple lines. Although few autumn vegetables, such as sliced celery and carrots, are now canned, the volume of business will have to come from the supply of vegetables and fruit during the winter months. The canning of fruit and manufacture of jam have received a strong stimulus from the cessation of sugar rationing.

Compared with the volume of canned foodstuffs consumed in many other western countries, there is enormous scope for the expansion of the industry.

New Uses for Fish Protein

RECENT research has shown that fish flesh proteins have at least as high a biological value as the proteins of meat and other animal products.

The value of animal proteins is roughly reflected in the prices paid for foodstuffs rich in there proteins. A study of such prices under normal conditions shows that animal proteins for human consumption cost about five times as much as fat. Fish and fish proteins cannot, therefore, be put to better use than as food or as a component of foodstuffs, as the proteins in this form achieve their maximum value.

However, under present conditions only a part of the catch can be used as food, and about an equal amount of fish protein—contained in surplus fish and waste products—is now converted into fish meal to be fed to animals, quite apart from the substantial portion which is actually lost.

Recent trends in fish processing, by which an increasing share of the catch is turned over to the filleting plants, have led to a situation in which greater quantities of fish offal are made available for industrial uses.

Fish Flour

The dry matter contained in the leavings from the filleting plants contains 70-80 per cent. protein, and is, *inter alia*, an excellent raw material for fish meal. If the best waste material is sorted out and subjected to a quick-drying process, a fish meal or fish flour suitable for human consumption can be obtained. Experiments made in 1939 showed that 6-7 per cent. of such fish flour could be mixed with wheaten flour without any noticeable change in the taste of the bread from which it is made.

Recent refining experiments made with such flour, involving a process of extraction, have shown that the fishy taste can be almost wholly eliminated. During experiments carried out in Norway, as much as 20 per cent. of this flour was mixed with grain flour for making various kinds of bakery products, and even this large addition was, in most cases, not detected.

It would be of advantage if the nutritive value of bread, a chief item of diet in most countries, could be increased by animal protein, which is present in fish flour in amounts ranging from 65 to 75 per cent. Lime, phosphates, and iodine are also present in substantial quantities.

In view of the large protein deficit in the world, which is particularly acute in countries with low living standards and limited financial resources, fish flour should be able to cover a part of this deficit, as it is a cheaper source of protein than any other foodstuff, and can also be incorporated in such products as macaroni, cheese-like products, pastes, and soups.

Edible Fish Albumen

The manufacturing process for the production of edible fish albumen was developed in Germany before the first world war, and has since been the subject of further investigation in many countries. The raw material consisted of practically pure fish flesh, the Germans originally using fish fillets. However, certain boneless parts left over from the filleting, for example the "belly flaps," may also be used.

The German process, which was rather primitive and expensive, consisted of the extraction of the glue-like substances by weak acid and of the flavouring substances by alcohol, and in the treatment of the extracted material with sodium hydroxide until it became entirely soluble in water. The solution was neutralised with acid and subjected to a drying process.

The achievement of self-sufficiency had evidently been the primary object, little regard being paid to the matter of cost. A further study of the process has, therefore, been carried out in Norway, and it has been found that the process can be much simplified, and that a better end-product can be obtained.

Edible albumen produced from fish has excellent emulsifying properties, and can be quickly whipped into a stiff foam, which keeps much longer than whipped white of eggs. It can be used in bakery products, custards, mayonnaise, stabilisers, and for emulsions. The efficacy of fish albumen as a substitute for white of eggs for baking purposes has been questioned because it does not coagulate when heated. However, there can be no doubt that it possesses the property of making many bakery products light and porous, and that it can partly replace, or serve as a useful supplement to, the eggs. A custard powder composed of fish albumen, edible oil, dried milk, sugar, and flavouring matter is one of the many uses to which fish albumen can be put. Stirred with water, such powder may be whipped into a stiff cream in a few minutes.

There is as yet no production of fish albumen on a commercial scale in Norway, but a company in Oslo has carried out a great deal of preliminary work, and operations in a pilot plant will soon be started.

Fish Protein for Technical Uses

Production of fish protein for technical uses is based on waste matter from lean fish, mainly codfish and related species. Experiments with such protein have been conducted both at the Institute of Technology in Trondheim and at the Norwegian Fisheries Laboratory in Bergen. At the Bergen Laboratory the fish material is cautiously treated with sodium hydroxide until the protein just goes into solution without being decomposed to any appreciable extent. After separation of bones and other insoluble matter, the protein is precipitated by acid. The relatively pure protein thus obtained amounts to about 60 per cent. of the total protein content, or about 10 per cent. of the weight of the raw materials used.

Abstract of an article by Prof. Olav Notevarp, the Norwegian Institute of Technology. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, No. 10, 1949.

The Chemistry of Edible Products

ALTHOUGH its title leads the reader to believe that a recently published book* is devoted to the chemistry of edible products, it is, in fact, a *vade mecum* of the German regulations, decrees, ordinances, and other enactments governing the composition, packing, and labelling of the foods which eventually arrive at the shop counters or restaurant tables.

An Elaborate Legislative Structure

Germany has built up an elaborate legislative structure in this field, and the author will have earned the gratitude of German food technologists, manufacturers, sanitary inspectors, analysts, and medical officers of health by his exhaustive and systematic presentation of the position *vis-à-vis* the law (as at 1948) of a great diversity of raw and manufactured products.

After a short introductory section dealing in a general way with the statutory and other regulations (German food trade associations also set up their own standards), the characteristics and definitions of individual products and the regulations specifically applying to them, as well as the relevant analytical methods, are considered under the following main headings: products of animal origin, vegetables, oils and fats, "dietetic specialities" (including diabetic foods, malt extracts, and infant foods), beverages (including those containing alcohol), spices and condiments, emulsifying and thickening agents, and other manufacturing aids such as egg substitutes, baking auxiliaries, and preservatives, "industrial goods," *e.g.* ice cream, blancmange powders, soup powders, and mayonnaise, and water (including spa waters).

Regulations Listed

The main sections are further subdivided in the manner already exemplified, each subsection being headed by a list of the regulations applicable to it, of which there are 20 for sausages, 26 for milk, 30 for cheese, and 28 for bread.

If due allowance is made for the differences between German and British legislation and practices, Dr. Egger's book will be found to contain much valuable data in a convenient form for a wide circle of potential readers. Particularly valuable, from the non-German standpoint, are the systematic descriptions of individual product compositions and associated analytical methods, with up-to-date literature references to compensate for brevity; these form the necessary background to Dr. Egger's main theme.—L. L.

* *Lebensmittelchemisches Taschenbuch* (*Pocket Book for Food Chemistry*). By F. Egger. Pp. 514+xxiv. Wissenschaftliche Verlagsgesellschaft, Stuttgart. Price DM. 44.

An Italian Caviare

FEW people realise that there are countries other than Russia which produce caviare. In Italy caviare, known as *bottarga*, is obtained from the tunny fish, which is the staple catch of the fishermen of Sicily, Sardinia, Calabria, and Elba.

The roe is first salted and immersed in pickle to remove all impurities. The natural transparent covering of the roes is preserved, and when the cleansing is completed the extremity is tied up with string. The little sacks thus formed are laid along a board, covered with salt, and pressed down with a weighted board. The position of the eggs in the roes is changed daily and the weights increased.

Drying Operation

The increasing of the weights is a delicate operation, as care must be taken that the individual eggs are not broken. After 25 or 30 days of this treatment the roes are hung up in the sun for five or six days to complete the drying. By now the roes are in the form of a solid block resembling kidneys in shape.

Bottarga is eaten in Italy usually sliced and seasoned with olive oil. It is also grated and mixed with butter, and in this form it would probably appeal more to British taste.

The price of *bottarga*, although much below that of the Russian caviare, is high, but this is not surprising, seeing that the yield of the final product is only about 1 per cent. of the fresh weight of the fish.

Correspondence

To the Editor of
FOOD MANUFACTURE

Milk Substitutes

DEAR SIR,—I have read with considerable interest the article by Lucius Nicholls in your March issue suggesting suitable compositions of a milk substitute, fortified with the necessary vitamins, for infant feeding in India and other poor milk-producing countries.

For five years my company has been trying to find hospitals, institutions, or schools, both here and in India, where physiological feeding tests could be carried out under medical supervision. In every instance supplies were offered free or at cost price, but lack of interest prevailed in each case.

Very strange, you may observe, in view of the dire need for milk-like nutritious and balanced infant foods!

Millions of parents and youngsters of all races in the world would be under an everlasting debt of gratitude to any medical superintendent who would permit reliable feeding trials to take place.

The crux of the problem is not the compilation of ingredients, but the economic factor; the cost of preparations fortified with all the synthetic vitamins necessary would work out equal to, or slightly dearer than, cows' milk powder. That should be no handicap with so many states willing to do the right thing by mankind, even if subsidies proved necessary to balance the cost, and granted that they would sponsor the requisite feeding tests, which would have to be of sufficient magnitude and duration to show reliable results.

Yours faithfully,

J. C. FERREE,
Director, Soya Foods Ltd.
London.

News from the Industry

FORTHCOMING EVENTS

The British Association

The next annual meeting of the British Association for the Advancement of Science will be held in Birmingham from August 30 to September 6, 1950.

The inaugural general meeting will take place in the Town Hall on August 30, when the Right Worshipful the Lord Mayor of Birmingham will welcome the members of the Association to the city. Sir Harold Hartley, K.C.V.O., C.B.E., M.C., F.R.S., will also deliver his Presidential Address on "Man's Use of Energy."

Conferences, public lectures, exhibitions, films, excursions, and visits, in addition to various social functions, will be included in the events. A full programme giving detailed arrangements will be ready early in August.

*

Chemical Research Laboratory

The Chemical Research Laboratory, D.S.I.R., at Teddington, Middlesex, is again holding a series of "Open Days" this year. There will be four sessions, on June 28 (afternoon), June 29 (afternoon), and on June 30 (morning and afternoon).

The afternoon of June 28 has been set aside for representatives of industrial firms who have not previously received invitations, and the Director would be glad to receive applications from firms up to June 19. It is not necessary for those invited in previous years to reapply.

The main branches of research are: (*a*) corrosion of metals; (*b*) inorganic chemistry; (*c*) radiochemistry; (*d*) organic chemistry; (*e*) high polymers and plastics; and (*f*) microbiology.

*

Royal Institute of Chemistry

The following summer visits have been arranged by the London and South-eastern Counties Section of the Royal Institute of Chemistry:

June 3. Betteshanger Colliery, Kent, at 10 a.m.
June 13. Battersea Power Station, London, S.W.11, at 2.15 p.m.
June 20. Kodak, Ltd., Lens Production Section, Wembley, at 11 a.m. Afternoon visit to their Wealdstone Works.
June 21. Earley Generating Station, near Reading, Berks., at 2.15 p.m.
June 24. East Malling Research Station, near Maidstone, Kent, at 10.30 a.m.
June 28. Rothamsted Experimental Station, Harpenden, Herts., at 2 p.m.
July 5. Pharmaceutical Specialities (May and Baker), Ltd., Dagenham, Essex, at 2 p.m.
July 13. Metropolitan Water Board, Water Examination Laboratories, Rosebery Avenue, London, E.C.1, at 2.15 p.m.
July 18. Tip Top Bakeries, Ltd., Orpington, Kent, at 2.15 p.m.

Industrial Lighting Fittings

To enable the advantages of fluorescent lighting to be obtained in industries where the atmosphere is either dust or vapour laden, Crompton Parkinson have introduced two new types of fluorescent lighting fitting.

Tough light alloy is used throughout for the enclosure of the high power-factor control unit, lamp-ends, and lampholders. The control unit is mounted centrally on top of the reflector and the wiring is taken to each lampholder through heavy-gauge tubes which are sealed off at each junction. The reflector is an open-ended pattern secured to the central unit by two finger-operated positive fixings.

The fittings are arranged for either chain or conduit suspension, and are designed so that there are no wells or channels to hold moisture; the use of gaskets and glands prevents moisture from reaching the control gear, lamp-ends, and lampholders.

Sealing is effected by felt gaskets in the dustproof fitting, which is for use in flour mills and other places where the atmosphere contains dust or fluff.

The vapourproof fitting has special silicone plastic washers sealing the lamp-ends to allow the fitting to be used in moist or wet atmospheres. It is particularly suitable for those industrial areas where moderate concentrations of acid or alkaline vapour may be present.

The lamps are easily replaced by the removal of end covers each secured by a single captive finger-nut. The starter switch is inserted in a gasketed hole in the side of the control gear box.

Record Exports

By exporting 14,800 cars, vans, trucks, and tractors during March, Ford Motor Company broke all their past records. This figure brings the company's exports for the first quarter of 1950 to 36,982, which compares with 26,419 for the last quarter of 1949.

Ham Cooker and Press

The reduction in weight loss is one of the advantages of a large automatic ham cooking oven designed to take sixty hams at a time. Cooking is performed by steam generated from the water well at the base of the oven, and only a few pints of water need to be boiled to raise the necessary steam. Once the oven is loaded the cooking is controlled by thermostat, and an automatic timekeeper can be affixed to the oven so that overcooking is avoided.

Another product of Jas. Stott and Co. (Engineers) is the Knit-close ham press, consisting of body with ratchet compressor plate and adaptor plate for small hams. A useful feature is that the ratchets are part of the lid and not on the body so that they are less liable to sustain damage. The press produces a shapely ham with top and bottom sides parallel.

Tank Contents Gauge

A new diaphragm type tank contents gauge for remotely indicating the contents of tanks containing syrups and other viscous liquids was exhibited by Evershed and Vignoles at the Physical Society's Exhibition held at the Imperial College recently.

The new gauge eliminates troubles from contamination, heat, corrosion, or viscosity, as no moving mechanism comes into contact with the liquid. It comprises a transmitter fitted near to the base of the tank and connected by two wires to one or more indicators or chart recorders installed at any convenient control centre.

The transmitter contains a diaphragm exposed to the pressure of the liquid in the tank. Through a system of compound levers the deflection of the diaphragm is opposed by the attraction of a coil by an electro-magnet, the current through the coil being automatically varied so as to balance the pressure on the diaphragm.

APPOINTMENTS

Mr. G. Dunn, Mr. W. Haigh, J.P., Mr. W. Johnstone, Sir William Palmer, K.B.E., C.B., and Mr. A. Whitaker have been appointed members of the Council of Industrial Design by the President of the Board of Trade.

He has also reappointed Sir Leigh Ashton, Mr. Noel Carrington, Mr. G. W. Lacey, C.B.E., B.Sc., F.R.I.C., Major F. J. Stratton, C.B.E., Sir Charles B. L. Tennyson, C.M.G., and Dr. W. J. Worboys, B.Sc., Ph.D., to be members of the Council on the termination of their existing appointments.

Mr. Andrew Nairn and Mr. R. Lyon Scott are being reappointed to the Scottish Committee of the Council of Industrial Design on the termination of their existing appointments.

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Professor Sir Ian Heilbron, D.S.O., F.R.S., has been appointed by the Lord President of the Council to be chairman of the Advisory Council for Scientific and Industrial Research in the place of Sir Geoffrey Heyworth, who resigned owing to pressure of other public duties.

The task of the Advisory Council, which is composed of persons eminent in industry and science, is to advise the Lord President of the Council on the policy and activities of the D.S.I.R.

Sir Ian Heilbron is now Director of Research of the Brewing Industry Research Foundation near Redhill, Surrey. This organisation is concerned with the problems of the fermentation industries, which now include antibiotics and vitamins.

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Mr. E. B. Anderson has been appointed a member of the United Dairies Research Advisory Council on vacating the post of chief chemist.

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Dr. E. Shepherd, M.A., B.Sc., LL.B., senior lecturer on science and milk at the Smithfield Institute of Food Technology, has succeeded Mr. W. Rees Jones as head of the Department of Food Technology, Blackpool.

Dr. Shepherd joined the teaching staff of the Smithfield Institute twenty years ago when it was the only institute in the world devoted exclusively to food technology. He is well known in the ice cream industry, on which he has given numerous lectures throughout Great Britain.

▪

Mr. Leslie Wilson has been appointed Director of Aslib in succession to Miss E. M. R. Ditmas. Mr. Wilson, a Cambridge graduate who has specialised in modern languages, has been Foreign Editor of the *Times Educational Supplement* since 1946. He is also a member of the Council of the Modern Language Association and editor of its periodical, *Modern Languages*.

▪

Mr. Clive Van den Bergh has joined the board of Van den Berghs and Jurgens, the manufacturers of Stork margarine, as a managing director.

He has relinquished the chairmanship of Hudson and Knight in order to take up this appointment.

▪

M. Caquot (France) has been elected President of the International Organisation for Standardisation (ISO) in succession to Mr. Howard Coonley (U.S.A.).

Membership of the ISO is confined to representatives of the national standards bodies throughout the world. The British Standards Institution represents the U.K., and implements international recommendations by reference to them in the appropriate British Standards.

▪

Mr. W. J. Sanders has been appointed general sales manager of Reads and associated companies in succession to Mr. Leonard Dodd, who is remaining with the company as general sales adviser.

Mr. Sanders was formerly sales manager of The Metal Box Co., South London branch, where he worked for 21 years.

After war service, he rejoined the sales department of the branch in October, 1945, assumed the appointment of commercial manager in April, 1947, and from January, 1949, was responsible for sales and production control.

Insecticide Dispenser

Introduced by Metal Box for packaging and dispensing insecticides is a finger-tip dispenser which consists of a seamless aluminium body with a tinplate top. In the centre of the top is a fine nozzle controlled by a valve. The insecticide is packed under pressure of a propellent gas which, when the valve is slightly pressed, forces it out in a fine spray. A four or five second burst of an insecticide from this dispenser will, within a few minutes, diffuse throughout a normal room in a concentration lethal to most insects, and will remain effective from two to three hours.

Overseas Visit to Bacon Factory

Eighteen students from all parts of the world recently visited Wall's bacon factory at Willesden under the auspices of the British Council.

The party, headed by Miss B. I. Hubbard, of the British Council, included young men from Siam, Egypt, Mauritius, Trinidad, Nigeria, Poland, and the U.S.A., and young women from Switzerland, China, and Cuba.

They were conducted round the slaughterhouse and bacon factory by Mr. Collan E. B. Brett, Wall's bacon production manager. Mr. Brett, himself a pig-breeder at Dells Farm, Stokenchurch, told the students something of contemporary conditions in the British bacon industry. He reminded them that British breeding stock was among the country's most sought-after exports.

Sales Reorganisation

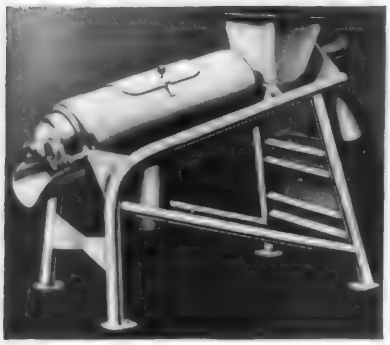
As part of a programme of development, three new appointments have been made by H. W. Carter and Co.

Mr. D. V. Cantwell, for many years sales manager of Aspro, becomes sales controller. Mr. C. H. Massingham remains marketing director.

Mr. Denis Courtney Embley will fill the newly created post of advertising and publicity manager, and will leave his present position as advertising manager of High Duty Alloys in the late summer.

W. H. Gollings and Associates, who have been appointed advertising agents with effect from July 1, are at once developing plans for extended advertising, and are engaged in restyling certain products.

Mr. Clifford Coope, the marketing consultant, will continue to act as merchandising adviser.



New pulping machine with capacity of two to five tons per hour.

Crevice-free Pulping Machine

Many unique features have been incorporated in a newly designed pulping machine which has been produced by A. Johnson and Co.

All parts in contact with the product are fabricated from stainless steel and there is descaled finish throughout. The main body casing has been considerably simplified and the resulting cylinder is a departure from the standard type. Each machine is complete with four 11 in. diameter stainless steel sieves, having perforations of 0·040, 0·094, 0·137, and 0·188 in. diameter respectively. The capacity varies between 2 to 5 tons per hour, dependent on the type of product being processed.

All the sieves are made reversible, thus ensuring an even distribution of wear. The twin brushes in the standard machine are of hardwood stock with union bristles, but nylon brushes may be fitted if required.

The replacement of brushes or the changing of screens is effected through the large opening at the base of the body casing, and a hinged inspection door is arranged at a convenient position.

When in working trim the machine is entirely crevice free, and the robust tubular frame enables cleaning to be considerably simplified. The standard model is fitted with a 3 h.p. totally enclosed motor, but for particularly heavy duty 6 h.p. motors may be fitted.

Bacon Curing Equipment

Originally designed to meet the requirements of the engineering industry, Flextol machines are self-contained units, comprising electric motor, flexible driving shaft, and one or more handpieces and accessories according to the operations to be performed. A development of interest to bacon curers is the use of this equipment for trimming and undercutting rib bones of pigs, including aitch and neck bones, prior to curing. The machine operates a saw revolving at 1,100 r.p.m. mounted in a right angle handpiece, thus effecting increased output and reduction in manual labour.

Health in Industry

Both the T.U.C. and the British Employers' Confederation have now given their approval to a proposal by the Central Council for Health Education that general health education should be carried out in factories and workshops.

Their approval applies only to the teaching of how to be healthy, and not to the consideration of working conditions or industrial risks. It is also felt that methods and means should be arranged locally with the workers' consent, and should not interfere with production.

The Council has accordingly told Medical Officers of Health that the way is officially cleared for them to go ahead in their own localities.

Rotary Pumps for Food

Designed on sound mechanical and hydraulic principles to meet the many requirements of the food and chemical industries, the Howard stainless steel rotary pump, while suitable for pumping thick fluids, will operate at electric motor speeds when pumping water and other thin liquids, and deliver them against considerable pressures without wear. The special shape of the rotors, avoiding deep concavities, obviates the trapping of fluids and the development of excessive local pressures.

The gears and races are all enclosed in a cast iron gear-case, the bottom of which forms an oil reservoir; seals are fitted where shafts extend into the gear-casing and prevent any oil leaking out.

The two rotors, which rotate in opposite directions to each other, transfer the liquid from the suction to the pressure side. These rotors always have a fine clearance between them which is filled with liquid, forming a fluid seal and thus preventing excessive slip.

The pump casing can be made jacketed for steam or hot water if required.

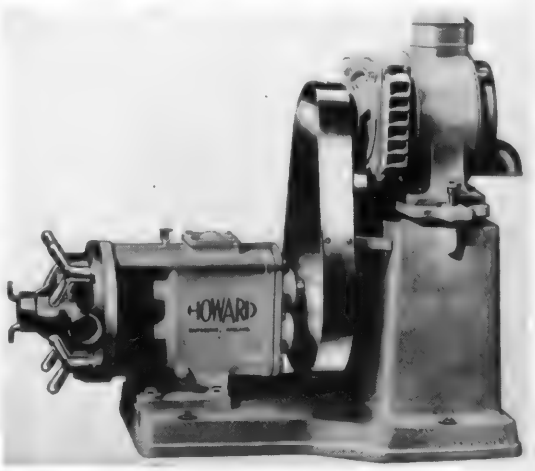
Potato Crisp Association

In view of the rapid expansion of the potato crisp industry and the need for an association to further its interests, seven midland potato crisp manufacturers met recently together with Mr. C. F. Carlisle, F.S.A.A., President of the Society of Incorporated Accountants for Nottinghamshire, Derbyshire, and Lincolnshire, to form the National Association of Potato Crisp Manufacturers. Mr. Carlisle has been appointed chairman, and a committee has been set up to consider applications for membership so as to ensure that the premises and working conditions of the firms concerned are in keeping with the standards set by the Association.

Productivity in Industry

The results of practical experiments carried out in different British industries, with examples drawn from such varied fields as the machine tool industry and agriculture, are published in *Productivity in Industry*, a pamphlet which was originally delivered as an address to the Present Question Conference by Sir Roy Pinsent.

His theme is that, whereas materialistic incentives are apt to lose their efficacy, increased productivity invariably appears where management and labour find a satisfying idea to live and fight for. "I am irresistibly drawn to the conclusion," he writes, "that British productivity will only match the needs of the nation again when we find an adequate ideological incentive. Democracy has to give to the worker, whether of brain or hand, a completely satisfying reason for giving his best, quite apart from material reward."



Rotary pump for liquids.

Wages Calculator

Compiled to meet a demand for a simplified system of working out total wages to be paid for time and overtime for the different schedules prevailing in industry, *Warne's Wages and Overtime Calculator* has now been published in an entirely revised and extended edition.

Owing to the upward trend in wages, it has been necessary to make some alteration in the tables as given in the first edition. The wages rates now show from $\frac{1}{4}\frac{1}{0}$ to 100 hours at 9d. to 5s. per hour, including sixteenths to 1s. 6d. and eighths to 5s., with overtime calculator showing the hourly values of overtime rates from time and one-tenth to double time, and percentage increases from 10 per cent. to 100 per cent.

The *Supplementary Tables* issued in 1947 to bring the wages rates up to 5s. per hour are still available, but are not so extensive as the latest edition which gives wages rates from $\frac{1}{4}\frac{1}{0}$ to 100 hours at 8s. 0½d. to 5s. per hour, advancing in halfpennies.

Changes of Address

One of the outlying sections of the Board of Trade, the Technical Information Documents Unit (T.I.D.U.), has moved to Lacon House, Theobald's Road, London, W.C.1. (telephone: Chancery 4411), from 40, Cadogan Square, S.W.1.

Reports, documents, and other records of German war-time industrial developments will continue to be at the disposal of interested British firms. T.I.D.U. will also continue to:

(*a*) Disseminate to British industry research reports which have been made available by the U.S. Government for this purpose.

(*b*) Arrange for the publication of Selected Government Research Reports.

(*c*) Act as National Centre for the United Kingdom in the O.E.E.C. Documents Exchange Scheme.

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The address of Drs. D. W. Kent-Jones and A. J. Amos is now: The Laboratories, Dudden Hill Lane, Willesden, London, N.W.10 (telephone: Gladstone 0665/6).

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New premises at Triumph House, 189, Regent Street, London, W.1. (telephone: Regent 4841-5), have been acquired by Dexion, Ltd.

The printing works of Krisson Printing, an associate company, will remain at the old address, 84, Fouberts Place, London, W.1.

S.C.I. Food Group

COMMITTEE'S REPORT FOR 1949-50

The conference on amino acids with which the session opened last September was the first Food Group Conference to last more than one day since the war, it is stated in the annual report of the Food Group Committee of the Society of Chemical Industry for 1949-50. The six sessions were well attended and numerous enquiries have been received for reprints of the papers given.

Other scientific meetings on a wide variety of subjects of interest to food technologists have attracted good attendance; many of these have been held jointly with sections or groups of the Society or with other bodies.

The tour to Bordeaux and its surrounding vineyards was an experiment in international collaboration, the party being joined in Paris by members of the *Société de Chimie Industrielle*. This proved most successful and did much to foster close relations with French food technologists.

The third conversazione of the Group, held on November 9, 1949, adequately fulfilled its purpose. As on the previous occasion, the London Section participated in the second annual dinner dance at Grosvenor House on February 8.

Early last year a joint committee of representatives of the Food Group and of the Society of Public Analysts and Other Analytical Chemists was set up to investigate the desirability of a revision of the 1925 Preservatives Regulations, covering also the question of antioxidants and other chemical substances used in food preparation. This committee has now announced its findings in a memorandum to be submitted by both Societies to the Ministers of Food and Health.

Many discussions have taken place in the Food Group Committee on the subject of the chairman's address given by Dr. Hughes at the last annual meeting on "The Future Structure and Activities of the Food Group." Some progress has been made, but no statement can yet be issued on the future organisation of the Group's activities.

The Microbiological Panel and the Nutrition Panel of the Group have continued their functions during the past year with considerable success.

Arrangements for the new session are already well in hand. The summer tour begins on June 8, when the party leaves for Norway; in the autumn the traditional joint meetings with the London Section (November 5) and the Society of Public Analysts and Other Analytical Chemists (December 6) will be held. The programme will include a conversazione and the annual dinner dance.

Developments at Stornoway

The development of quick freezing facilities at Stornoway has been announced by the Herring Industry Board, and work has started on the erection of quick freezing plant to handle kippers, and ice making plant which may be designed to handle fresh herring. If the plant is designed on these lines it will be capable of handling 10 tons of herring per day and 5 to 10 tons of kippers with an eventual throughput of 50 tons of kippers per day.

Mechanical kippering plant may be removed from Lerwick to Stornoway; expansion of the meal and oil reduction plant at this centre is also planned.

Change of Telephone Number

The telephone number of Aluminium Union, Ltd., The Adelphi, Strand, London, W.C.2, is now Trafalgar 7878.

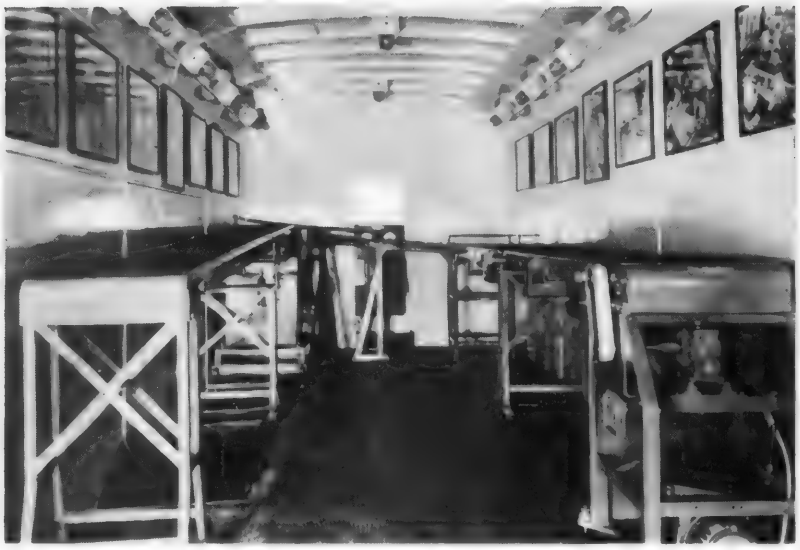
New Ice Cream Packages

To keep ice cream powder in the fresh state in which it leaves the factory, Soya Foods have prepared new packages, lined with Pliofilm.

Canadian Company Formed

In order to further their export drive, Vokes Limited have inaugurated a subsidiary company, located in Toronto, Canada; Mr. J. Parkinson, the former sales manager of the English company, has been appointed Vice-President and general manager.

In addition to handling the whole range of the parent company's equipment, Vokes (Canada) will also act as agents for a number of British companies. Among these is the firm of Flexibox, whose mechanical seals are used in oil refinery and chemical plant process pumps, refrigeration compressors, and pumps handling foods and corrosive liquids.



Mobile showroom fitted with complete conveyor circuit.

Mobile Showroom

A mobile showroom which will demonstrate the advantage to be gained in all industries by the use of handling equipment in the conveyor field has been put on the road by J. Collis and Sons.

The inside, which is illuminated by fifteen 100 W. lights, contains a complete conveyor circuit, well over 35 ft. in overall length, and incorporates a comprehensive range of the company's products. On the walls are photographs of applications of the MotaVeyor in industry and commerce. The interested manufacturer is thus given the opportunity of examining the usefulness of the products on his own doorstep; he can also test at first hand the capabilities of the equipment with regard to the handling of his own products.

Bottling Equipment

Designed for the smaller and medium-sized dairy, the Junior bottle filler and capper is described in a folder on bottling equipment issued by Cherry-Burrell. Operating on the gravity filling principle, the machine handles 25 to 42 bottles per minute. A rotary accumulating table is built in for hand feed and discharge and two rubber star-wheels direct bottles to filling and capping tables.

All standard sizes of bottles can be filled, and sealed with cardboard discs or aluminium caps as required.

The company's method of aluminium cap sealing, as well as their machines for forming and packing such caps, are also described.

Tube Fittings for Food Plants

A new range of stainless steel tube fittings for the milk, brewing, and food industries is shortly to be marketed by the Talbot Stead Tube Co. The specialised fittings include unions, both welded and expanded, tubular tees, bends, reducing bends, pipeline, blank caps, and a wide variety of flanged bends, tees, and crosses.

All are being manufactured according to the British Standards specifications for milk tube fittings, but fittings will also be produced to special requirements.

Using Gas for Bottle Washing

The heating of water and detergent solution for large-scale bottle washing plant by means of gas was described by Mr. J. E. Cooper, technical manager of the Potterton Gas Division, Thomas De La Rue and Co., at a meeting of the London and Southern Junior Gas Association.

In the past, said Mr. Cooper, heating had been commonly performed by steam, generated in solid-fuel boilers. As it was often necessary to keep the main boiler at work merely to provide steam for the bottle-washing machines, fuel costs tended to become high. Experiments had shown that heating could be carried out satisfactorily and at low cost by gas boilers. At the moment, Mr. Cooper continued, the company's experience lay mainly in the washing of beer, wine, and mineral water bottles, but it was likely that there would be developments in the washing of milk bottles.

Fan-cooled Motors

A range of standard flameproof fan-cooled motors in both foot and flange mounted type is being made by Newman Industries.

The company's latest product, the Elf fractional horse-power motor, incorporates three important advances: reduced overall dimensions, quietness of running throughout the life of the motor, and a design of centrifugal switch proved to remain silent even after 800,000 operations.

Refrigeration Equipment

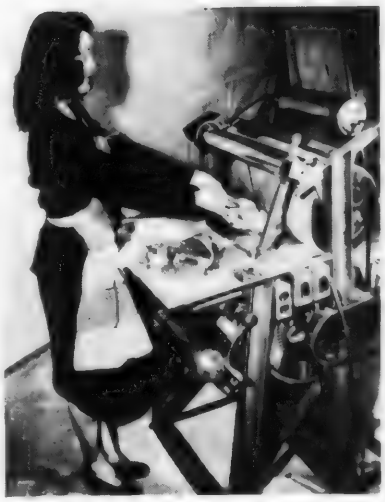
Designed specially for the fish trades, a cabinet with a capacity for 10/12 stone of wet fish is among the wide range of refrigeration equipment made by the Pressed Steel Company. Commercial equipment also includes the Frezemetic soft ice cream counter freezer which enables ice cream to be mixed and dispensed from the one unit, and a service cabinet model with special features, including large-capacity ice maker, drip tray, "Crispator," interior light, and chromium-plated locking handles.

Advance in Refrigerated Transport

A step forward in the provision of refrigerator units for the transport of perishable foods has been made by T. Coleborn and Sons. By means of their patented process, the firm can build any type of unit from a simple insulated container to a complete, self-refrigerated motor vehicle of up to 20 tons. This includes transport by land or sea, and covers the whole temperature range from cool to 40 degrees below freezing point.

The self-contained refrigerator units are thermostatically controlled and fitted with alternative drives, enabling them to be powered from their own small petrol or Diesel engine, or from any main supply. Built throughout in a light alloy, they have interlocking panels and an almost complete absence of rivets which give them great rigidity, ease of repair, and attractive streamlined appearance.

Meat, fish, and fruit, which at present undergo various temperature changes in transit, can, by this means of transport, be given adequate refrigeration facilities in any type of vehicle. Fruit, quick frozen vegetables, and other produce from abroad can be kept at any required temperature on board ship in a container wired temporarily to the ship's mains through a transformer.



Wrapping with the snug-wrap machine.

Wrapping Irregular Shaped Goods

The latest development in the handling of irregular shaped goods is the snug-wrap machine of American origin which applies a tight individual wrapping of Pliofilm to such commodities as chickens, chops, roast meats, vegetables, fruits, and small mechanical equipment.

The film is passed over electrically heated rollers, and between two foamed latex rolls which cushion it tightly round the article to be wrapped, at the same time forcing out all air. A conveyor belt carries the package forward, the speed of operation corresponding with the speed at which the commodity is fed into the rollers.

Fruit Wrapping Machine

A development of interest to the fruit packing industry is a new machine which will wrap fruit varying from 2 in. to 3½ in. diameter without adjustment. Apples are placed in pockets of a feed conveyor and roll one at a time into a cup, with the stalk upwards. A sheet of paper is cut off from a reel and positioned under the apple; a vertical plunger then gently presses the fruit and sheet down into the wrapping mechanism, where a completely tight seal is formed. The wrapped fruit is released on to a delivery conveyor and carried forward to the packer or direct into the storage boxes.

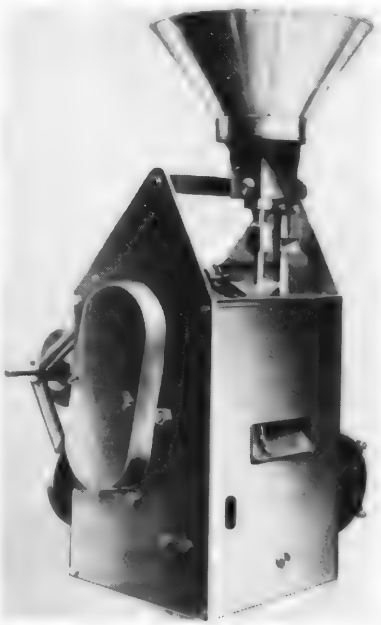
The machine, known as the Repeto, is portable, fully automatic, and driven by a ¼ h.p. motor from any lamp socket. The speed is fifty wraps per minute, giving an output of 90 to 100 40 lb. boxes in an eight-hour day.

New Grades of Thermometals

Four new grades of temperature-sensitive bi-metals, or Thermometals, have been introduced by Henry Wiggin and Co.

Suitable for such applications as circuit breakers, R.667 has a high electrical resistivity, while Veriflex has a range of maximum sensitivity at 300° / 600° F., and is designed for use where high rates of deflection are required at these temperatures.

Introduced to expand the range of sensitivity of the Thermometals, Autoflex is suitable for applications at high temperatures; Rayflex is similar to the existing Highflex 45, but is recommended to replace it in thicknesses below 0·010 in., where it has more constant deflection properties.



Salt and Tablet Twist Machine

Incorporating a patented razor slash-cutting device for the paper, the Autopack machine automatically forms salt twists for enclosure in potato crisp packets or pill and tablet twists. The machine, developed by the Automatic Weighing and Packing Machine Co., feeds the waxed paper from a roll, and cuts off the exact length required; a funnel then descends, cupping the paper and at the same time feeding an exact quantity of salt or pills from a specially designed measure chamber (or counting device for pills or tablets). Three complete turns are made in the twisting unit, securing the paper to prevent spillage, and the twists are finally discharged down a chute at a speed of seventy a minute.

Irish Moss Extract

An Irish moss extract, which is being offered to the trade under the name of Vegeline, is now being processed by Fine Industrial Commodities. This is a pure extraction of high viscosity, suitable for many phases of the industry requiring an emulsifying, stabilising, and suspending medium. Tasteless, odourless, and of great strength, the material becomes soluble in water before boiling point, and no previous preparation is needed.

Engineering Plant

Specialists in the supply, erection, and operation of pumping plant, including all necessary power units and auxiliary equipment, the firm of Tangye produce a range of pumping machinery covering centrifugal, reciprocating, and axial flow types, in "surface" and "sub-ground" designs.

Their AR type pumps comprise centrifugal pumps for belt, vee rope, or direct motor drive. Standard pumps are suitable for hot or cold water, oils, etc., and with the use of special materials can also handle acids, alkalis, and other process liquids. Specially suited for handling liquids containing solids in suspension, even when these possess marked abrasive qualities, are the Nochoke centrifugal pumps, while the axial flow (propeller type) pumps are particularly suitable for condenser circulating service and similar duties.

A wide range of hydraulic presses for forging, flanging, bundling, packing, and various other operations, hydraulic pumps, valves, and fittings, clipping presses, shearing machines, lifting equipment, internal combustion engines, and machine tools are included in the products of the company.

Hydraulic jack with detached cistern and pump.

Annual Meeting of B.F.M.I.R.A.

ADDRESS ON QUALITY IN FOOD

The British Food Manufacturing Industries Research Association held its annual general meeting in London at the Royal Institute of Chemistry recently. During his Presidential Address on the subject of quality in food, Professor Sir Frank Engledow pointed out the need for improved standards. The meaning of quality in food, he said, must be compounded from the opinions and desires of producers of raw materials, of food manufacturers, of medical and other scientists, and of consumers.

Referring to the primary attributes of quality, *i.e.* the inherent properties of raw materials and their processing, Sir Frank said that these were less obvious to the consumer than were secondary attributes, such as cleanliness. Evidence collected by the Association showed that the nutritional value of meat was increased by suitable heating, and this was not necessarily less valid for canning than for ordinary cooking.

Both food producers and manufacturers might justly complain of governmental and medical indifference to inherent quality, and failure to recognise that higher quality often involved increased costs in production and manufacture. Some food manufacturers looked on scientific analysis of quality simply as an aid to the maintenance of commercial standards. It was much more than this —it showed how quality could be improved by controlling production and manufacture.

Lt.-Col. G. R. Harding, D.S.O., M.B.E., chairman of the Council, presented the annual report, accounts, and balance sheet, which were unanimously adopted.

Sir Frank Engledow and Mr. J. G. Mathieson (Clarnico) were re-elected President and Vice-President respectively. D. W. Collier (Cadbury Bros.) and A. Glover (Co-operative Wholesale Society) were elected to fill vacancies on the Council. The following, due to retire from the Council, were re-elected: M. G. Abrahams (Excel Co.); G. B. Stancliffe (W. S. Shuttleworth and Co.); R. E. Brown (J. F. Renshaw and Co.); C. P. Thorpe (Needler's); R. P. Woollard (London Oil Corporation); J. A. Sainsbury (J. Sainsbury); C. P. B. Shippam (C. Shippam); J. E. Tulip (Tyne Brand Products); R. C. Wilson (Newforge); C. O. Barber (Batchelors Peas (Southall)); H. R. Hayward (Hayward Bros.).

The chairman stated that owing to the good progress which had been made on the Association's new research headquarters at Leatherhead, there was every hope of the building being ready for occupation in June. The new building would permit expansion which was impossible in their present quarters.

Industry had voluntarily donated nearly £70,000 towards the cost of the land, equipment, and building, and the Government were making a grant. It was estimated that the maximum additional donations required would amount to about £9,000.

A survey of the Association's activities and a list of members were given in the annual report for 1949, from which it would be seen that the membership continued to grow.

Polythene Tubing

Made in all sizes from ½ in. to 12 in. inside diameter with various wall thicknesses, large bore extruded polythene tubing offers considerable possibilities for the plant of manufacturers handling liquid foodstuffs. The tubing is made in any continuous length and is jointed by means of special flanges, screw-couplings, or sleeve joints.

Valves for piping installations, buckets, cans, tank linings, and almost any kind of fitting are also made by Tenaplas in this odourless, non-contaminating, and non-toxic material, which is very light and at the same time tough and hard wearing. It is unaffected by acids, alkalis, or salt solutions, but cannot be used for mineral oils or for hot liquids above 70° C.

Products for the Baking Industry

A new product of interest to the food industry is air-floated G.M.S. which, owing to its fine state of subdivision, is an ideal additive in any powder used in the manufacture of products containing milk and other protein suspensions of emulsions. In mixtures with flour, the product diminishes the loss of moisture from the loaf or cake, indicating its use as an anti-staling agent. Unlike waxes, it is tasteless in flour and devoid of grittiness.

Other new items made by the Watford Chemical Co. are Estaphat, developed for use in bakeries as an anti-staling agent, and Estax 41N, prepared from pure vegetable fat esters and having an extremely low acid value, which decreases the loss of teaseed oil during frying.

New Food Premises

The factory of Batger and Co., sweet manufacturers, is being rebuilt at Clapham Common, London, S.W.4.

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Extensions to the Danish Bacon Company's Southend (Essex) factory are being carried out.

*

New laboratories are being built for Glaxo at Sefton Park, Bucks.

*

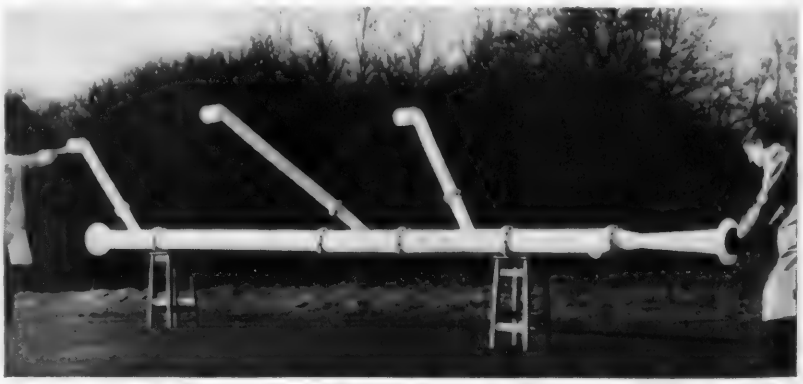
McVitie and Price are extending their bakery premises at St. Andrew Biscuit Works, Robertson Avenue, Edinburgh, at an estimated total expenditure of £40,000.

*

L. Rose and Co., lime juice manufacturers, are planning to erect a new factory on a site at Yardley Road, Kirby Trading Estate, Liverpool.

*

Smith's Potato Crisps are considering plans for the building of a new factory at Portchester.



Polythene tubing for the handling of liquid foodstuffs.

A.D.A. Annual Meeting

At the annual general meeting of the Aluminium Development Association held recently, members received an encouraging report of the activities of the Association during the year 1949.

The new President is Mr. Edward Player; Mr. E. Austyn Reynolds was elected Vice-President, and Mr. F. G. Wollard was re-elected chairman of the Executive Committee for a further year.

B.A.C. Dinner and Dance

The doyens of the chemical profession were present at the first annual dinner and dance of the London Section of the British Association of Chemists, held at the Charing Cross Hotel on March 24.

The Association's President, Dr. Herbert Levinstein, occupied the chair, and was supported by a number of other eminent chemists including Sir Robert Robinson (President of the Royal Society), Prof. J. W. Cook (President of the Royal Institute of Chemistry), Sir Ian Heilbron (President of the Chemical Society), Mr. Stanley Robson (President of the Society of Chemical Industry), Prof. Newitt (President of the Institution of Chemical Engineers), Dr. Jordan (Director of the Paint Research Station), Dr. Hughes (Chief Chemist, Farnborough Aircraft Research Establishment), and Dr. H. J. T. Ellingham (Secretary of the Royal Institute of Chemistry).

In his address, Dr. Levinstein outlined the aims of the Association and spoke of the great opportunity of uniting all engaged in the profession into a fellowship existing for mutual service. Replies were made by Sir Robert Robinson, Sir Ian Heilbron, and Prof. J. W. Cook.

Self-service Approved

Based on an enquiry undertaken by the research officer of the Union of Shop, Distributive, and Allied Workers, the *Report on Self-service in the Retail Food Trades* has now been issued. This covers the extent of self-service today, its effect on staff and on profits, and its potentialities.

Consequent upon the review, the executive council of the Union advise their members to co-operate in further experiments in this form of trading, subject to the observation of certain safeguards.

Obituary

Mr. John Alfred Bowsher. On April 20 at the age of 76. An appreciation will be published in the July issue.

▪

Mr. Joseph Sykes, a director of Reads. On April 3, in his eightieth year.

Mr. Sykes was originally apprenticed in the tin box industry to Barclay and Fry in 1885. He joined Reads in 1904 as factory manager at their Southend works, and did not retire from full-time work until January, 1949. He maintained until his death a great interest in tin box making, which he had seen progress from individual packages hand made by tinsmiths, usually in isolated booths so that their craft was kept secret, to modern high-speed automatic manufacture.

He was responsible for the production of containers for many wars, and in 1900 he won a competition for the design of a tin for Queen Victoria. The Queen gave to all the troops in the Boer War one of these highly decorated tins containing chocolates, and there is at the company's Bridgewater Street factory one of these tins containing chocolates which still appear to be eatable.

▪

Mr. Gavin Lawson, Ph.C., M.P.S., A.R.I.C., F.C.S., chief chemist and director of Cumming, Parsons. On April 16, at the age of 40.

Mr. Lawson went to the head office of the company in Manchester in 1936 and took a very active part in building up a wide range of exclusive flavourings.

In recent years he was connected with many associations, in particular the Ice Cream Alliance, in which he acted as hon. technical adviser to the north-western division.

Census of Production

INFORMATION REQUIRED FROM FIRMS

The scope of the Census of Production for 1950 and the information to be obtained have now been settled after consultation with the Census of Production Advisory Committee. The statutory form of return will contain sections relating to (1) working proprietors; (2) employment; (3) wages and salaries, etc.; (4) materials and fuel purchased; (5) work given out; (6) stocks at the beginning and end of year; (7) output and merchanted goods sold; and (8) analysis of sales. The first five of the sections will be broadly as for 1949, except that for wages no quarterly figures but only the year's total will be required.

An important change in the questions for 1950 from those in previous censuses is that firms will be asked to give the total value of sales and of stocks of merchanted goods.

In the output section, firms will also be asked to state separately the total value of sales of their own manufactures, and the total payment received for work done. The analysis of sales section will be on broadly the same lines as for 1948, but will cover merchanted as well as manufactured goods.

A voluntary enquiry into capital expenditure is being undertaken by the Board of Trade and other departments among a sample of industrial firms, and it has been decided that, if this enquiry meets with a satisfactory response, no questions about capital expenditure need be included in the Census of Production for 1950.

Special consideration has been given to certain trades, including the following, where it is common for establishments to do both processing and merchanting or retailing:

> Wholesale bottling; fish curing; cattle, dog, and poultry food manufacture; tea blending and coffee roasting; ice making; bread and flour confectionery; milk bottling, etc. (but not manufacture of milk products); constructional engineering; metal scrap and waste processing.

In these trades Census of Distribution returns will be required from firms who are engaged in merchanting or retailing, and Census of Production returns will be required from firms who are engaged wholly in production.

No establishment engaged mainly in these trades will be required to make both a Census of Distribution and a Census of Production return, and for establishments in those trades which make a Census of Production return the form will be confined to the section requiring an analysis of sales.

Further details of the census requirements for 1950 are being sent to trade associations.

Bulk Delivery of Sugar

TYPICAL RECEIVING PLANT

One of the new road tankers.

The first of a fleet of road tankers, introduced into Great Britain by Tate and Lyle for the bulk delivery of sugar supplies, came into service at Stockport (Cheshire) recently.

Manufacturers at present receive sugar from refineries in jute or paper bags; under this system it takes half an hour to unload six tons of sugar, but with tanker delivery this time can be cut to eight minutes.

According to an official of the company, bulk delivery of sugar to manufacturers is a revolutionary change. Any manufacturer who uses 1,000 tons or more of sugar a year will find that the equipment necessary to receive sugar in this way should pay for itself in under two years by lower handling costs. The method is also more hygienic.

In a typical receiving plant for refined granulated sugar delivered in bulk, the vehicle discharges the sugar into the boot of an elevator, capable of handling 25 tons per hour, which, in turn, discharges it directly into the hopper. As the pile of sugar mounts to the top of the hopper the incoming sugar is drawn forward by a spiral levelling conveyor which can also deal with 25 tons per hour and by this means the hopper is completely filled. Reclaiming sugar for process is effected by opening any of a number of slide valves situated in the foot of the hopper, which then allows the sugar to enter the reclaiming conveyor.

This conveyor is situated a little to one side of the bottom of the hopper and the sugar enters it at the side. By this means, the flow of sugar into the conveyor is made self-regulating.

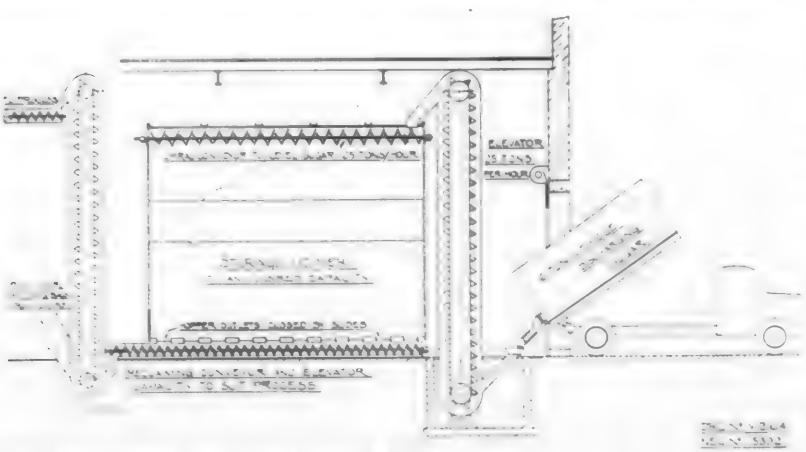
From an end view of the hopper, its shape is somewhat like a diamond with steep bottom sides at 50° to the horizontal. The top sides need only contain the natural slope of the sugar from the levelling conveyor in the apex, which would be about 30° to the horizontal.

The hopper is best constructed of timber, for its insulating value, lined with aluminium, and contained in a steel framework. All parts in contact with the sugar in elevators and conveyors must be made rustproof and every care must be taken to see that nuts and bolts cannot become detached and enter the sugar.

Manufacturers in Britain consume some 800,000 tons of refined sugar a year. A switch over to bulk delivery would mean a saving of 8,000,000 jute sacks a year, each of which costs approximately 2s. 6d. In addition to the price factor there is also some doubt about the future availability of jute, most of which comes from India.

Bulk shipment of raw sugar has also been introduced.

The sugar is discharged into the boot of the elevator.



Flow sheet showing new method for bulk delivery of sugar.

New Potato Crisp Factory

A potato crisp factory is being started at Stanley Street, Lowestoft, Suffolk, by Andrew Johnson and Knudtzon, herring exporters.

It is expected that the business will be gradually developed to include the production of other food specialities.

Anonymous Gift for Research

An anonymous gift of £200 has been received by the British Baking Industries Research Association as a donation towards its expenditure on research. The donation is stated to be an expression of the desire to commemorate in tangible form the work that Mr. George Bruce Small, M.B.E., did in bringing about the establishment of a research organisation for the baking industry.

As the gift will attract an equivalent amount of Government grant, it will be possible to devote the money to the purchase of a substantial piece of equipment, and on it will be mounted a commemorative plate to honour the name and work of Mr. Small.

Booklets Received

Another edition of Mr. A. Ll. Matthison's booklet *Baking Lacquers for Food Containers and Closures* has been issued; this is substantially the same as the last edition which was printed about two years ago, but brings up to date information about Holden's food can lacquers, which are dealt with in the third chapter. The other two chapters cover the application of lacquer, types of container, and methods of processing.

▪

Three principal types of porous ceramic media have been developed by Doulton and Co., and details of the various grades in normal production, together with their pore sizes and flow characteristics, are given in *Porous Ceramic Media and Accessories*, section No. 10 of the company's new series.

A full range of non-pressure and pressure filter units, including those intended primarily for laboratory use or for research and development work, are also illustrated.

▪

Comprehensive data are contained in a new Henry Wiggin publication, *K Monel—Physical and Mechanical Properties*, on the precipitation-hardening nickel-copper alloy which has the corrosion resistance of Monel, combined with mechanical properties equal or superior to those of heat-treated alloy steels.

The publication includes results taken at both normal and elevated temperatures, covering compression, shear, fatigue, and tensile impact, and there are brief notes on available forms and on heat treatment.

▪

The February, 1950, issue of the *F.M.S. Bulletin* is as bright as ever, containing as it does both informative articles and domestic news. It is a particularly good example of a house journal.

COMPANY NEWS

At the annual general meeting of Wm. P. Hartley held recently, the directors recommended that a final dividend of 5 per cent., less tax, should be paid on the ordinary shares for the year ended October 31, 1949, making 10 per cent. for the year.

▪

Although operating on reduced profit margins during 1949, United Canners have been able to return combined net profits of £115,800 owing to a greatly increased turnover of their Benedict peas and other products. Some of the company's plans for expansion in the past have been frustrated, but considerable fresh progress was made in 1949.

In spite of expenditure on land and buildings, the financial position has been strengthened and a dividend of 25 per cent. has been maintained.

▪

The year 1949 was a favourable one for the soft drinks industry and their export trade showed a substantial increase, said Mr. Lauchlan Rose, chairman of L. Rose and Co., in his statement at the annual general meeting of the company.

Another lime estate in Dominica has been acquired and the plantation business has been carried on successfully, but with a decreased return from West Africa, owing to a disease of the trees. The wine business showed satisfactory progress during the year.

The directors recommended a final dividend of 10 per cent. on the ordinary shares, making a total of 15 per cent. for the year ended December 31, 1949.

▪

Once again all previous sales records were exceeded, but were not sufficient to offset increased production costs, it was announced by the chairman, Mr. John Weedy, at the forty-sixth annual general meeting of Cerebos.

The turnover had been maintained and every effort was being made to increase sales wherever possible.

Since the close of their financial year they had acquired the whole of the share capital of Henry Seddon and Sons, with subsidiary companies in London, Nottingham, and Dublin.

A final dividend of 30 per cent., less tax, making 40 per cent. for the year, was recommended.

*

The completion of a number of new units which came into production during 1949 brought their expansion programme forward, with the result that sales reached the budgeted rate at the end of the year, it was stated by Mr. E. A. O'Neal, Jr., chairman of Monsanto Chemicals, in his report at the sixteenth annual general meeting. Turnover for the full year in 1949 fell below expectations, although total sales were up, being 8·75 per cent. higher than in 1948.

An interim ordinary dividend for the year to December 31, 1949, at the rate of 15 per cent. had been paid, and a final dividend of 30 per cent., less tax, was recommended.

OBITER DICTA

- There is not an earthly chance of London and other cities getting cream.—*Mr. Richard Hilliar of the National Dairymen's Association.*
- A row over dried peas, said to have been supplied to the Austrians by Moscow, is one of the stumbling blocks to a peace treaty with Austria.—*"Daily Express."*
- There is an old saying that we have to eat a peck of dirt before we die, but we do not need to hasten the event.—*Miss A. C. Tait on the unhygienic storing and distribution of food.*
- Bread and milk—the food of innocents; who could guess what hidden dangers lurk therein! We may find that "a crumb over the eight" may be a term of opprobrium in time to come. —*Lord Hawke.*
- The first Food Minister was Joseph. He wore a coat of many colours. It is clear, therefore, that Joseph was not a party man.—*Mr. Maurice Webb at the Wine and Food Society's Victory Dinner.*
- A great deal of misery and suffering in Brunswick and other wards is caused by Mrs. Braddock and people like her chasing hares through this council which they know perfectly well they cannot substantiate.—*Councillor S. Minion of Liverpool City Council.*
- The difference between an omelette one gets in a little restaurant on the road to the South of France and an omelette in a British restaurant is not the cooking, but the love which goes into the ingredients.—*Mr. Kenneth Hall, chairman and joint managing director of Quality Inns.*
- The Socialists say the houses being built now are larger and have more amenities, such as built-in refrigerators, but many a young wife would willingly do without a built-in refrigerator if she could get rid of a built-in mother-in-law.—*Mr. Elliot, M.P. for Kelvingrove.*
- I don't see why people who prefer white bread should be forced to eat brown, any more than those who prefer brown should be made to eat white. I can't understand why some brown bread supporters get so excited, dictatorial—yes, and even venomous about it. Perhaps it is the sort of bread they eat that makes them that way! —*Letter to the "News Chronicle."*

World Food News

Fruit Juice Conference

Included in the programme of the Second International Congress of Fruit Juice Producers, to be held in Zurich from June 1 to 4, will be reports on the hygienic and therapeutic value of fruit juices and the oxidising phenomena in their preparation and preservation, together with a study of the steps to be taken in order to further the development of consumption of fruit juices throughout the world.

Ireland's Fish Canning Prospects

Lecturing to students at the Technical School in Dun Laoghaire, County Dublin, Mr. P. J. Loughrey, managing director of Batchelor and Company (Ireland), said that there was a future for the fish canning industry in Ireland; he also spoke of the great encouragement which could be given to the fishing industry if canning factories were erected at strategic points along the coast.

New Swiss Decree

Under a recent decree of the Swiss Federal Authorities, a wide range of electrical equipment will, during the current year, become subject to compulsory testing and the application of a safety mark.

The list of equipment subject to compulsory tests is to be drawn up by the Swiss Association of Electricians, who will also prepare detailed regulations for carrying out the new provisions.

These regulations will apply equally to goods imported for use in Switzerland.

Lists will be maintained of the equipment bearing the safety mark and showing the manufacturer's name and factory mark. In the case of foreign equipment, the name of the manufacturer or of the responsible Swiss distributor must be shown.

The date of operation of these safety measures will be fixed by the Swiss Department of Ports and Railways when they have approved the regulations to be drawn up by the Swiss Association of Electricians. After this date it will be illegal for equipment not bearing the safety mark to be offered for sale unless special permission has been obtained from the Swiss Authorities.

Dehydrated Oysters

A Hiroshima scientist, who has perfected a dehydration process for oysters, claims that the dehydrated oysters return to normal size and flavour after seven hours in pure water.

Snack Food from Rice

Developed by the U.S. Department of Agriculture's Bureau of Agricultural and Industrial Chemistry, "rice curls," a new snack food prepared from ground rice, can be served like potato chips, corn chips, or similar foods, with salads, beverages, and appetisers.

One aim of the laboratory's work was to produce rice curls with as little residual oil as possible, since this results in a product that feels less greasy and keeps better. When made properly, the curls have an oil content as low as or lower than that of comparable food items. They retain their crispness and flavour well in storage and are not subject to excessive breakage in packaging and handling.

Laboratory tests of various ways to prepare rice curls showed that the rice should be ground fairly fine (to pass a screen having about twenty-four openings per linear inch) and mixed with an approximately equal weight of boiling water to make a thick paste. Optimum diameter of the circular openings recommended for extruding the paste was found to be $\frac{1}{16}$ in.

Cooking the curls in vegetable oil at a temperature of 400° - 425° F. gave best results. Products fried in cottonseed, corn, peanut, and sesame-seed oils all had similar characteristics. Cooked in a hydrogenated oil, they had a less oily appearance, although their oil retention was about the same. After cooking, the rice curls are drained and sprinkled with flavourings.

Crystal Coffee

The issue of patent rights and the financing of a one million dollar firm to produce and market a crystal coffee which dissolves instantly in ice or hot water have been announced by the U.S. National Research Corporation, the company which developed the first frozen orange concentrate. A factory will be built in the Boston area to manufacture the product.

S. Africa Alters Margarine Laws

According to a recent announcement, the South African Government intends introducing legislation to legalise the manufacture and sale of margarine. It will be a white product in order that it may be readily distinguished from butter.

The production and distribution of margarine on a large scale has been urged for many years. Hitherto it has been produced by certain firms under strict control and its sale has been conducted through State distributing organisations only.

Under the new legislation, general food stores may be able to sell margarine for the first time.

The production of butter satisfied pre-war demand, but the dairy industry has been unable to meet the country's requirements in the post-war period, and this has induced the change in the traditional policy—in spite of persistent opposition from dairy interests.

A batch of rice curls is drained after frying in cooking oil.

DOLLAR ENQUIRIES

Filter Presses and Other Equipment

The United Kingdom Trade Commissioner at Montreal has received an enquiry from Leeming-Miles Ltd., 1, Notre Dame Street West, Montreal, for filter presses, collapsible tube fillers, collapsible tube crimpers and closers, and tablet counters.

This company, who are reported to be a large and responsible firm, would be particularly interested to receive quotations for these items from United Kingdom firms who are already represented in Canada.

It is suggested that any firms interested in this enquiry should write to Leeming-Miles Ltd., either direct or through their Canadian agent, giving full particulars of any machines they are able to offer.

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Small-type Gas Refrigerators

Mr. Hugh McIndoe of the Gas Appliance Company, distributors of Servel gas refrigerators, of 4044, Broadway, Kansas City 2, Mo., wishes to contact United Kingdom manufacturers of small-type gas refrigerators.

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Food Products

The United Kingdom Trade Commissioner at Montreal has reported that H. Gamer and Co., 1207, University Street, Montreal, are anxious to contact United Kingdom producers of confectionery and allied products such as jams, jellies, marmalades, pickles, canned fruits, and fruit juices, with a view to representing them throughout Canada.

Until recently the company's main business has been with United States firms, but they consider that they are in a position to carry out successfully the distribution and merchandising of United Kingdom products.

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Tropical Raw Materials

H.M. Consul at St. Paul, Minnesota, reports that the J. R. Watkins Company of Winona, Minnesota, who are important users of tropical raw materials for the production of extracts, medicines, and disinfectants, are anxious to contact United Kingdom firms who are in a position to supply such materials, which include vanilla beans, cocoa, pepper, cinnamon, cloves, nutmeg, ginger, and sage. They would also like to obtain supplies of tin.

Firms interested in this enquiry are invited to communicate with the J. R. Watkins Company direct, addressing their letters to the Vice-President of the company, Mr. D. C. Alexander, and quoting prices c.i.f. in U.S. currency.

▪

Kippers and Sole

The British Consulate-General at Chicago reports that Mr. Bob Slavik of the Morley Sales Corporation, 188, West Randolph Street, Chicago 1, Illinois, would be interested to receive quotations from British firms able to supply quality lines of fish. The items in particular demand are kippers and frozen fillet of sole.

United Kingdom firms should bear in mind that Canadian kippers are readily available, and they would, therefore, have to compete with these so far as quality, price, and packaging are concerned.

Interested parties are invited to write direct to Mr. Slavik submitting quotations, c.i.f. in dollars.

Apple Browning Prevented

A method for making a superior type of apple juice that retains most of the colour, aroma, and flavour of the fresh juice has been developed at the Experiment Station, Geneva, N.Y. The new process involves the addition of ascorbic acid powder to the milled apples just before they are pressed. The powder may be dissolved in a little apple juice and sprayed on the apples, using ¼ oz. of the powder to a pint of juice for each bushel of apples.

The ascorbic acid delays changes in the apples that produce browning of the fruit until the oxygen causing this can be removed by de-aeration and the enzymes can be made inactive by pasteurisation.

Apple juice prepared in this way has been canned successfully on a large scale; it can also be preserved by freezing.

East African Meat Cannery

The largest meat cannery in East Africa has been erected near Dar-es-Salaam in Tanganyika, and production is planned to begin this year. The factory has been built by Tanganyika Packers, a partnership company of Liebig's Extract of Meat Company, and the Tanganyika Government holds 51 per cent. of the £500,000 share capital of the African company.

It is planned to produce canned brisket of beef, beef roll, sausages, beef fat, corned beef, and beef extract, and the installation of an up-to-date laboratory at the factory will ensure the maintenance of high quality. The inedible products of the factory will include tallow, bone meal, blood meal, glue, and hides. It is hoped that, by the end of 1950, the factory will be handling 500 head of cattle a week, and there are plans for a considerable expansion if the output justifies it.

With the establishment of the new factory in Tanganyika, it is unlikely that sufficient supplies of cattle will be obtainable for the existing Athi river plant in Kenya, and this factory is to be closed down; the Kenya Government, however, have agreed to purchase a large part of the factory buildings, to be used for an abattoir for the supply of meat for local consumption.

Most of the machinery from the Athi river plant is to be removed to Arusha in North Tanganyika, where Tanganyika Packers have started the construction of a small cold storage works to supply the meat demands of the area; it is hoped to market beef and pork products further afield at a later date.

Food Chemist Honoured

Dr. W. F. Geddes, Chief of the Division of Agricultural Biochemistry, University of Minnesota, voted one of the top ten agricultural and food chemists in the United States in 1947, was again honoured by receiving the Thomas Burr Osborne Medal at the banquet of the Annual Convention of the American Association of Cereal Chemists, held in Chicago. This medal is awarded by the Association for outstanding contributions to cereal chemistry.

In the food field, Dr. Geddes has had wide contact, largely in the cereal industries. He is a member of the Sub-Committee on Foods, National Research Council, and served on the Committee on Food Research, Office of the Quartermaster General, U.S. Army.

As editor of *Cereal Chemistry*, the official publication of the American Association of Cereal Chemists, of which Dr. Geddes is a Past President, he has considerable influence on scientific literature in the cereal food field. He has published nearly 200 scientific and technical papers, and received the King George VI Coronation Medal.

Pliofilm for packing fruit and vegetables.

Prepacking Fruit and Vegetables

Particularly suited for the prepackaging of bulky fruits and vegetables, the "Snap-Sack," produced by the Shellmar Products Corporation, Ohio, is a conventional square-style bag made of Pliofilm with an elastic band sewn into the top. This enables the bag to be opened to full capacity, making the filling operation easy and fast and providing an automatic reclosure. A small opening remains to provide ventilation and to give easy access to contents.

Conserving Fluid for Herring

Herring worth £5 million were lost by Norway this winter because too many were being caught and the processing factories were oversupplied.

It is now reported that a Norwegian scientist, R. Perry Howden, has succeeded in producing a chemical fluid for conserving the herring; fish which he conserved in January is claimed to be as fresh now as when it was caught. If further tests prove satisfactory, it will be possible for gluts of herring to be stored in silos and transported to the factories as and when required.

Today the factories producing herring oil and meal are able to work only during the actual herring fishing season. If the herring is conserved, work can be spread over a much longer period, and the capacity of the factories will be much more economically utilised.

New Ice Tray Treatment

A treatment for synthetic or natural rubber used in manufacture of ice trays, so the ice can more easily be removed, is described in a recent U.S. patent. The rubber is immersed in the following solution:

	Per cent.
Sulphuric acid (conc.) ...	80
Glycerine	20

The solution, which imparts a velvety feeling to the rubber, gives it a finish which offers little frictional resistance and is water repellent.

S. African Fish for Malaya

Importers in Singapore and the Federation of Malaya have offered to buy annually more than five million 1 lb. tins of South African pilchards. Although the industry, which is concentrated on the west coast, between Cape Town and Walvis Bay, cannot immediately meet the increased demand, it hopes to be in a position to do so in the near future. It is reported that South Africa obtained this offer from Malaya in the face of severe competition from other producing countries.

Record Whaling Season

The season's target of 16,000 blue whale units was reached by Antarctic whaling expeditions in record time —84 days compared with 102 days last season—and the international whaling statistical office in Norway had to order catching to cease on March 15. The high catching rate is said to be due not to whales being more plentiful but to more and better boats and equipment.

The five nations participating in this season's Antarctic whaling have produced about 1,800,000 barrels of whale oil, in addition to some 200,000 barrels of sperm oil and the catch of the three shore stations. Total output last season was 2,200,000 barrels, and it is likely that this season's output will not appreciably exceed this amount.

Norway's combined output from pelagic, shore, and sperm whaling this season is expected slightly to exceed 1,000,000 barrels, which is equal to about 170,000 tons of whale oil. Abount 70,000 tons will be exported in the raw state, including 50,000 tons sold to the British Ministry of Food for £80 a ton. The remaining 100,000 tons will be processed in Norway, and much of it will afterwards be exported in a refined state.

German Canned Foodstuffs

Officials in Bonn report that first contacts established for the possible export of canned ham from the West German Republic to the U.S. revealed favourable prospects for such shipments, which would be made in return for American deliveries of bacon and lard. However, the general outlook for German exports of canned meat is not regarded as bright. The East German Republic—the only likely large-scale market—seems to have little interest in canned goods other than vegetables.

A contract for the supply to the Russian occupation area of canned vegetables to the value of 6,000,000 D.M., signed during March, will tend to alleviate the supply position on the West German market, where stocks of canned vegetables and fruits have been piling up at an alarming pace due to consumer resistance, particularly to lines packed in black-metal cans.

Whipped Cream Container

A new, easy-to-use container for whipped cream has been produced by Reddi-Wip, Inc., of St. Louis, Missouri. The cream is whipped mechanically and the cans filled and gassed with a mixture of nitrous oxide and carbon dioxide. At the time of canning, vanilla, sugar, and stabiliser are added. The contents stay fresh as long as ordinary cream if properly refrigerated, and can be used with mayonnaise for salad-dressings, and as an enricher for hot chocolate and coffee.

The containers save time in hand-whipping cream and cleaning bowls and beaters. Each can gives thirty-one servings, almost 1 quart of ready whipped cream.

New type of container for whipped cream.

News from the Ministries

Appointment

The Parliamentary Secretary to the Ministry of Food, Mr. F. T. Willey, has appointed Mr. G. W. Ford to be his Private Secretary.

Soft Drinks

The Soft Drinks Order, 1947, has been amended with effect from April 19, 1950, so as to bring the minimum fruit juice content of all soft drinks containing citrus fruit juice and barley into line with that hitherto prescribed for lemon barley only. The minimum fruit juice content of these drinks is accordingly reduced from 80 to 48 fluid ounces per 10 gallons of finished beverage from consumption undiluted, and from 2½ to 1½ gallons per 10 gallons for consumption after dilution.

This reduction has been made because the higher fruit juice content was found to mask the flavour of the barley.

Confectionery and Cocoa

Imports of chocolate and sugar confectionery and chocolate couverture from Poland and chocolate confectionery from Finland are now permitted under the block licensing arrangements previously announced.

No alteration is necessary to block licences already held by importers. All enquiries should be addressed to the Cocoa, Chocolate, and Sugar Confectionery Division, Ministry of Food, London Road, Stanmore, Middlesex.

Limited quantities of chocolate and sugar confectionery and chocolate couverture from Belgium and Luxembourg and chocolate confectionery from Switzerland may also be imported under specific licence.

Importers should submit samples of confectionery, together with the manufacturer's name and address, to the Ministry of Food, Bakery and Confectionery Division, London Road, Stanmore, for classification.

Applications for import licences on Board of Trade Form ILD/A should be submitted in duplicate to the Import Licensing Department, Board of Trade, Romney House, Tufton Street, S.W.1, but for administrative convenience they should be sent through the Ministry of Food, Bakery and Confectionery Division, London Road, Stanmore.

Decontrol of Nut Kernels

The Nut Kernels Order, 1947, as amended, has been revoked from April 23, 1950. The effect of the revoking Order is to withdraw control of the prices of nut kernels and to remove restrictions on retail sales of processed nut kernels, such as ground almonds and desiccated coconut.

Import of Sugar-Fat Mixtures

Imports of sugar-fat mixtures containing cocoa butter are not now permitted.

The block licensing arrangements for imports of sugar-fat mixtures from Czechoslovakia, Denmark, Faroe Islands, Holland, Republic of Ireland, Metropolitan France, Norway, and Sweden remain otherwise unchanged. Licences should, however, be returned for amendment by the Import Licensing Department, Board of Trade, Romney House, Tufton Street, London, S.W.1. For administrative convenience the licences should be returned through the Ministry of Food, Miscellaneous Foods Division, 6-10, Sussex Place, London, N.W.1.

More Food Imports Freed

As from the beginning of May, various foods and raw materials have been added to the list of goods which may be freely imported from the usual list of "permitted" countries to which the policy for the liberalisation of trade is applied.

In future butter beans, desiccated or flaked coconut, and millet seed (including millet sprays) may be freely imported from these countries.

Herbage seeds and cereal seeds are to remain on specific licensing until the end of 1950, and other agricultural seeds until the end of March, 1951; after these dates restrictions on their import from the "permitted" countries are liable to be lifted.

Nuts, which previously could be freely imported only if "in shell," may now in addition be imported shelled. Peanuts will continue to require a licence.

The previous freedom to import certain natural essential oils and certain floral concretes and absolutes, is now extended to cover all natural essential oils and all floral concretes and absolutes.

N. Ireland Bread Subsidy

Following consultation with the trade, the rate of bread subsidy in Northern Ireland has been increased from 2s. 11d. to 3s. 6d. per sack with effect from February 26, 1950.

Incubator Clear Eggs

From May 8, incubated eggs which are marked with the letter "H" will be released from control and hatcheries will no longer be required to sell them only to licensed buyers or licensed packers.

The necessary amendments have been made to the Eggs (Great Britain) Order, 1949, and the Eggs (Northern Ireland) Order, 1949.

Use of Thermometers in Fishing

The Ministry of Agriculture and Fisheries research vessel *Ernest Holt* has been engaged in investigating the best water temperatures on the bed of the sea for fishing cod on Bear Island grounds. Work so far carried out shows clearly that Bear Island cod is not as a rule found in large quantities in water appreciably colder than 2° C., although during the season of heavy feeding from July to September, cod towards Sea Horse Island were frequently taken in very large quantities in water colder than 0° C. It appears that the cod is not so sensitive to cold water when pursuing food as it is at other times.

Importation of Cherries

With the object of preventing the introduction of the Cherry Fruit Fly, the Minister of Agriculture and Fisheries has made an Order under The Destructive Insects and Pests Acts, 1877 to 1927, affecting the importation of cherries from European countries into England and Wales during 1950. The provisions of this Order are supplemental to any requirements of the Board of Trade and the Ministry of Food.

From May 19 the importation of cherries grown in Spain is prohibited. Cherries grown in France, Italy, Germany, Austria, Bulgaria, Hungary, Switzerland, and Portugal will be admitted up to specified dates subject to certification as prescribed in the Order; cherries from other European countries will be admitted provided they are accompanied by certificates of origin.

Prices of Refined Oils

No change will be made in the prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period ending June 17, 1950.

Change of Address

The West London and western district office of the Export Credits Guarantee Department has been removed from Mayfair Court, Stratton Street, W., to Victoria House, 99/101, Regent Street, W.1 (tel.: Regent 0682/3/4).

Canned Fruit and Vegetables

The Imported Canned Fruit Order, 1950, and the Home Canned Fruit and Vegetables Order, 1950, which came into force on April 30, 1950, replace with amendments the Canned Fruit and Vegetables (No. 2) Order, 1946, as amended.

The principal changes are:

1. *Canned tomatoes* are freed from price control. All canned vegetables will now be free of price control.
2. *Minimum Weights:* Mixtures of raspberries and red currants, and of carrots and processed peas, have been added to the list of fruit and vegetables which may be canned commercially in Great Britain. A minimum fruit and vegetable content has been prescribed for each sized tin containing these mixtures and for a new sized tin (No. 1 Tall Can) containing any of the fruit or vegetables included in the list.
3. *Licensing:* Special licences are no longer required to can beans, peas, and certain other fruits and vegetables, but canners must still hold licences (issued under the Canning of Food and Feedingstuffs (Control) Order, 1942, as amended) authorising them to can. Licences are no longer required to freeze fruit and vegetables, to preserve fruit, or to bottle vegetables.
4. *Records:* It is no longer necessary to keep records of fruit and vegetables bought for canning.
5. *Syrup:* Up to 25 per cent. of the sugar used in syrup for canning fruit or vegetables may be natural sugar (*i.e.* sugar other than cane or beet).

The existing maximum prices prescribed for specified varieties of imported canned fruit are contained in the new Imported Canned Fruit Order. Other varieties of imported canned fruit and all home-produced canned fruit remain free of price control.

Canned Fish Price Changes

The Imported Canned Fish (Maximum Prices) Order, 1950, has been made which revokes and re-enacts the Imported Canned Fish (Maximum Prices) Order, 1947, with some amendments.

The principal changes in the new Order, which came into force on April 8, 1950, are:

1. The maximum prices of sardines are increased at all stages of distribution.
2. Canned mackerel and snoek have been removed from the schedule of maximum prices, since no further purchases are contemplated by the Ministry.
3. Adjustments have been made to the maximum wholesale prices of some other varieties of canned fish.

Imports of Edible Pulses

Since September, 1939, the Ministry of Food has been the sole importer of edible pulses (dried peas, beans, and lentils), but with the forthcoming removal of control over these commodities and the revocation on July 1, 1950, of the Pulse (Control and Prices) Order, 1943, as amended, arrangements are now being made for imports to revert to private trade.

Lentils, including split lentils, were added to the list of items which may be imported under open general licence with effect from March 1, 1950. It is also intended to include butter beans and white and yellow splitting peas in these arrangements.

Open individual licences will now be granted for other types of white beans for human consumption (except beans from Yugoslavia). For the time being such licences will normally be issued only to canners of beans in tomato sauce. Beans from Yugoslavia, which are not being reserved for canners, will be subject to specific licensing. Applications for open individual licences and specific licences should be submitted (in duplicate) to the Board of Trade on form ILD/A, which may be obtained from the Board of Trade, Import Licensing Department, Romney House, Tufton Street, London, S.W.1, or from the usual Customs Offices. For administrative convenience, importers are asked to send such applications to the Board of Trade, through the Ministry of Food, Home-grown Cereals Division, London Road, Stanmore, Middlesex.

There is no change in the arrangements for pulses imported for animal feeding.

Banana Prices

The Bananas Order, 1948, has been amended so as to bring all bananas, whatever their country of origin, within the scope of those provisions of the Order which relate to price control. Previously the maximum prices prescribed by the Order applied only to bananas imported from Jamaica, the British Cameroons, and the Canary Islands. The reason for amending the Order is that small supplies are now arriving from Sierra Leone.

Suspension of Milk Restrictions

An Order has been made suspending from April 9 to July 1, 1950, the Use of Milk (Restriction) Order, 1945, which prohibits the use of milk in the manufacture of specified articles, *i.e.* biscuits, bread, buns, pastries, cakes, scones and other similar articles, ice cream, soft cheese, curd cheese, sweetmeats (including sugar confectionery and chocolate), and synthetic cream, except by caterers or under licence.

At the same time an open general licence for the same period has been issued giving a general authorisation for milk to be supplied to and used by food manufacturers without restriction of quantity.

During this limited period manufacturers of ice cream, soup, bakery products, chocolate and sugar confectionery, and other food products will be able to obtain supplies of milk without recourse to permits. Normally the transaction will be on the basis of semi-retail sales at prices agreed between buyers and sellers, but not exceeding the maximum retail price.

Manufacturers who are in a position to take milk in full tank loads of 1,000 gallons or more will be able to obtain supplies from main supply or feeder depots at 2s. per gallon delivered, provided the written agreement of the Ministry has been obtained. Applications should be made to the appropriate Regional Milk Supply Officer. Such sales will be treated as depot sales on which depot remuneration and transport allowances will be paid at the usual rates. Depot proprietors will sell the milk at wholesale rates and the manufacturers concerned will claim their rebate direct from the Ministry of Food.

A General Licence has also been issued under the Cheese (Control and Maximum Prices) Order, 1948, allowing soft cheese and curd cheese to be sold free from price control during this period.

Information and Advice

Pickled Cockles

B.4189. *We shall be glad if you can furnish us with a method of pickling cockles.* (Suffolk.)

The following method for processing cockles may be used as a basis for trial:

The clean meats are washed and immersed for three hours in a 3 per cent. salt solution, after which the brine is drained off and the cockles are immersed for three days in a 3 per cent. solution of distilled vinegar to which has been added 3 per cent. salt. The cockles are packed in glass jars, which are filled with vinegar, spiced or otherwise. The jars are then sealed and processed. Processing times and temperatures must be ascertained by trial, but these vary from about 60 minutes at 212° F. to 25 or 30 minutes at 221° F.

Effervescent Drink Tablets

B.4220. *Can you supply us with a formula for tablets which when added to a glass of water would give a cooling effervescent drink?* (New Zealand.)

The following formula for lemonade tablets is offered purely as a basis for experiment:

Crystal sugar ...	4 lb.	Saccharin ...	30 gr.
Sodium bicarbonate	8 oz.	Lemon flavour ...	¼ oz.
Powdered tartaric acid	8 oz.	Turmeric colour...	*q.s.*
		Light magnesia ...	200 gr.

A tablet produced from this formula should be capable of being compressed without any granulation, but the acid and soda should be thoroughly dried before mixing.

Calves' Foot Jelly

B.4284. *Can you suggest a formula for the manufacture of calves' foot jelly?* (London.)

The feet are thoroughly washed, and then scalded by placing in a vessel of boiling water for a few minutes. The scum should be removed and the water poured off. The feet should again be covered with boiling water, and allowed to boil for about 10 hours, or until a sample of the stock will set on cooling. It may be necessary to add a little gelatin, or about ½ lb. of thoroughly defatted pork rinds per set of feet may be included. If it is intended to include such ingredients as wine, etc., due allowance must be made for the diminution of the jelling qualities of the stock. The stock should be passed through a hair sieve and allowed to set in a convenient mould, and, when it is thoroughly cold, the oil, etc., can be removed from the surface.

The jelly is heated slowly until it becomes liquid, and to each gallon of stock the rind and juice of 5 lemons, 1½ lb. of white sugar, and the whites and shells of 6 eggs are added. The whole is simmered for about 15 minutes and strained through a jelly bag, and strained again if necessary; the mixture should be kept warm to prevent solidification of the jelly. Colour can then be added and the jelly filled into jars.

If desired, soluble oils of lemon or orange can be used for flavouring, using about 1 oz. per 100 lb. of stock. Some recipes call for the addition of peppercorns, cinnamon, and white vinegar.

A good jelly can be produced without the use of calves' feet from the following formula:

Water to produce 10 gallons	5 lb. gelatin
18 lb. sugar	9 oz. citric acid
9 lb. glucose	Colour and flavour to suit

The gelatin should be soaked for three or four hours in cold water and the surplus water drained off prior to use.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.4166. *Roasted and salted peanuts.* (Ireland.)
B.4172. *Heat-sealing machines.* (Middx.)
B.4176. *Peanut butter.* (London.)
B.4181. *Coconut substitute, marzipan, and Chellies.* (Scotland.)
B.4182. *Drinking straws.* (Lancs.)
B.4183. *Machine for slicing orange peel.* (Lancs.)
B.4194. *Lemonade powder.* (Scotland.)
B.4195. *Sardine packers.* (Ireland.)
B.4197. *Chocolate pulverisers.* (Surrey.)
B.4198. *Cellophane bags.* (Ireland.)
B.4202. *Confectionery and biscuit machinery.* (India.)
B.4206. *Can openers.* (Westmorland.)
B.4207. *Transparent plastic tubing.* (Devon.)
B.4208. *Homogenisers and mechanical sieve for straining meat.* (Ireland.)
B.4212. *Junket powders.* (Essex.)
B.4213. *Wax dipping closure for bottles.* (Ireland.)
B.4216. *Cheese flavour.* (Mont.)
B.4221. *Cherry in fondant unit for chocolate covering.* (Glos.)
B.4222. *Rusk manufacturers.* (Ireland.)
B.4226. *Brawn filling.* (Ireland.)
B.4229. *Machinery for the automatic packing of tea.* (London.)
B.4233. *Chicory powder, salad oil, and mustard powder.* (Singapore.)
B.4234. *Metal closures for vinegar bottles.* (Northumberland.)
B.4238. *Grinding machine and roasting machine for coffee.* (Lancs.)
B.4239. *Machinery for blanching and shelling nuts.* (London.)
B.4240. *Scrim.* (Ireland.)
B.4241. *Peeling and coring machines for apples.* (Ireland.)
B.4245. *Electric peelers for potatoes.* (London.)
B.4250. *Machinery for filling semi-fluid cream into waxed cartons.* (Durham.)
B.4254. *Peel cutting machinery suitable for lemon and orange caps.* (Scotland.)

Information Required

B.4285. *Details of the manufacture of sweetened fats, and references to books on the subject.* (Singapore.)

Recent Patents

636,574. Mountain Grey Apiaries, Ltd., and Heaton, G.: Honey presses.
636,576. Southall and Smith, Ltd., and Cheshire, F.: Automatic packing machines.
636,586. Anstee, M. R.: Storage of root crops.
636,644. Vicars, Ltd., T. and T., and Naylor, J. F.: Moulding of baker's dough and the like plastic material.

Abstract of a Recent Specification

Ice Cream Manufacture

This invention relates to a method of manufacturing or preparing ice cream resulting in a product not obtainable by existing methods.

The process of pouring a syrup into a mould, inserting a stick into the mould, and freezing is already known, and the object of this invention is to obtain a similar article made from ice cream instead of syrup.

This cannot be achieved in the same way because the stick will not become united with the ice cream, and because the ice cream cannot be withdrawn from the mould in the same way.

If the ice cream is deposited in the mould and a small quantity of syrup (or any other palatable liquid of a non-fatty texture) is then placed centrally into the ice cream, and the stick inserted, the whole being then subjected to freezing, which unites the stick, the syrup, and the ice cream into a homogeneous article, the ice cream and the syrup can be eaten from the stick.

Difficulty may be experienced, however, in withdrawing the frozen products from the moulds, but by relaxing the freezing action very slightly where the ice cream and the mould are in contact, withdrawal is facilitated. In this way the ice cream no longer adheres to the mould surface. It should be made clear, however, that the freezing action is only slightly relaxed. It is not necessary or desirable to set up actual thawing. For instance, the desired result may be achieved by dipping the mould into cold water for a few seconds.

It is desirable to avoid trapping air in the mould when the ice cream is first fed into it; this may be done by suitably manipulating the ice cream or by employing perforated moulds. The ice cream should be moderately hard frozen before being fed into the moulds.

The products may be made of any suitable shape so long as it is one which can be drawn from the correspondingly shaped mould.

635,960. *William Richardson and Ernest Richardson.*

Recent patents have been selected from the "Official Journal of Patents" and are published by permission of the Controller of H.M.S.O.

Trade Marks

MISSEBELLA.—672,492. Canned fish. **Sociedade Comercial Algarve Limitada** (a corporation organised under the laws of Portugal), Largo José Libanio Gomes, No. 2, Portimão, Portugal; Manufacturers and Merchants.

NUTTABISKO.—673,975. Biscuits (other than biscuits for animals). **Atkinsons of Windermere, Limited,** Oldfield Works, Windermere, Westmorland; Manufacturers.

PACKER'S.—676,981. Chocolate and chocolate confectionery. **H. J. Packer and Co., Limited,** 87, Carlyle Road, Greenbank, Bristol; Cocoa and Chocolate Manufacturers.

PAT-A-FISH.—682,414. Dried breadcrumbs for use as dressings for fish, rissoles, and for similar foodstuffs. **John Crampton and Company, Limited,** Pomona Spice House, Altrincham Road, Sharston, Wythenshawe, Manchester; Merchants.

STARBROOK.—682,443. Canned vegetables. **Conserves Alimentaires Établissements Van De Poel and Co.,** Stabroek, Belgium; Canners of Vegetables.

EDENTHOR.—682,886. Vegetable cutting machines and potato peeling machines, and cutting devices for use in such machines; and vegetable washing machines. **Penny, Johnson, Limited,** Westgate Road, and Auden Grove, Newcastle-upon-Tyne, 4; Merchants.

TEMUL. — 682,974. Preparations of stearic acid and glycerine water white for use as ingredients in food as emulsifying agents. **Chemia Products (U.K.) Limited,** 10-13, Dominion Street, South Place, London, E.C.2; Manufacturers and Merchants.

WELLCROFT.—683,107. Bread, pies, biscuits (other than biscuits for animals) and flour confectionery. **R. Johnstone and Son, Limited,** Eglinton Bakery, 20-22, Wellcroft Place, Glasgow, C.5; Manufacturers.

FLIPS.—683,217. Non-medicated confectionery. **George Payne and Co., Limited,** 21-24, Queen Elizabeth Street, Tower Bridge, London, S.E.1; Merchants.

"FRIGOLD." — 683,269. Preparations consisting principally of flour for use as dressing for fish. **T. G. Watson, Limited,** 95, Grove Street, Glasgow, C.4; Rusk Manufacturers.

SUNSWEET.—683,456. Preserved and dried fruits. **California Prune and Apricot Growers' Association** (a corporation duly organised under the laws of the State of California, United States of America), 84, West San Antonio Street, San Jose, State of California, United States of America; Growers and Packers.

Trade marks have been selected from the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

New Companies

R. C. Hill and Son (Bridgwater), Limited. (478572.) To carry on business of bakers, caterers, confectioners, grocers, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: R. C. Hill, Mrs. G. C. Hill, and G. D. Hill, all of 78A, Durleigh Road, Bridgwater.

W. and J. Vernon, Limited. (478576.) 304, Flixton Road, Flixton, Lancs. To carry on business of butchers, slaughterhouse proprietors, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: W. Vernon, 304, Flixton Road, Flixton, Lancs; J. Vernon, 320, Flixton Road, Flixton, Lancs.

Frozen Fruit Products (Leatherhead), Limited. (478606.) 43, Lower Fairfield Road, Leatherhead. To take over business carried on at Leatherhead by Frozen Fruit Products Co. Nom. cap.: £100 in 2s. 6d. shares. Dirs.: C. G. Thomas and Julia E. Craydon, 2, Sackville Villas, Poplar Road, Leatherhead; R. H. Smith, 46, Bramley Way, Ashtead, Surrey.

L. H. Produce Agencies, Limited. (478615.) To carry on business of importers, exporters, and manufacturers of and dealers in foodstuffs, etc. Nom. cap.: £100 in £1 shares. Dirs.: not named. Subs.: Geraldine Robson, 39, Elgin Crescent, W.11 (secy.); G. A. Pearlman, 10, Millington House, Stoke Newington Church Street, N.16 (Acct.).

North Cambrian Bakeries, Limited. (478620.) White Rose Bakery, Gas Works Lane, Prestatyn, Flints. Nom. cap.: £10,000 in £1 shares. Dir.: C. C. Whitson, 79, Dee Banks, Chester.

Brown's Fisheries (Ilford), Limited. (478650.) 1125, Christchurch Road, Boscombe, Hants. Nom. cap.: £2,000 in £1 shares. Dirs.: Mrs. M. M. Brown and C. B. Brown, Croft House, Corfe Mullen, Dorset; P. H. Antell, Sunny Lea, Corfe Mullen, Dorset.

H. L. Blackford, Limited. (478701.) 14, High Street, Worcester. To take over business of a baker and confectioner carried on at High Street, Worcester, by H. L. Blackford. Nom. cap.: £3,000 in £1 shares. Dirs.: H. L. Blackford (permt.) and Mrs. D. E. E. Blackford, Rivershill, Barneshall Avenue, Worcester.

Lyngrays, Limited. (478724.) 101, King Street, Stretford, Lancs. To carry on business of bakers, confectioners, grocers, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: F. G. Gray and Gladys M. Gray, 424, Barton Road, Stretford, Lancs.

K. Allmond and Co. (Cowley), Limited. (478761.) 93, Wilkins Road, Cowley, Oxford. To carry on business of bacon curers, pork and general butchers, etc. Nom. cap.: £4,000 in £1 shares. Dirs.: K. Allmond, 27, Stapleton Road, Headington, Oxford; H. E. Warner, 93, Wilkins Road, Cowley, Oxford.

O. C. Stevens and Sons, Limited. (478773.) Reliance Bakery, Canvey Island. To take over business of bakers and confectioners carried on at Canvey Island by Stevens and Son. Nom. cap.: £500 in £1 shares. Dirs.: O. C. Stevens, Reliance Cottage, Leighbeck, Canvey Island; A. T. Stevens, Sundown, Gazelle Drive, Canvey Island; R. O. Stevens, The Moorings, 18, The Drive Way, Canvey Island.

T. C. Merritt and Son, Limited. (478784.) West Street, Midhurst. To carry on business of butchers, pork butchers, slaughterhouse proprietors, grocers, etc. Nom. cap.: £4,000 in £1 shares. Dirs.: T. C. Merritt, Lansallos, June Lane, Midhurst; T. L. Merrit, West Street, Midhurst.

A. W. Jeffreys, Limited. (478798.) 22, Botolph Lane, E.C.4. To take over business of fish merchants and salesmen carried on at Botolph Lane, E.C.4, by A. W. Jeffreys and Company. Nom. cap.: £1,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: A. W. Jeffreys, 57, Braunton Avenue, Sidcup, Kent; H. T. Warren, 38, Timothy Road, E.3.

Bennett and Moore, Limited. (478800.) 66, St. Andrew's Street, Cambridge. To carry on business of bakers and manufacturers of and dealers in bread, flour, biscuits, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: B. F. Moore and Phyllis N. Moore, 8 and 9, The Broadway, Mill Road, Cambridge; Margaret Bennett, 204, Cherry Hinton Road, Cambridge.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.